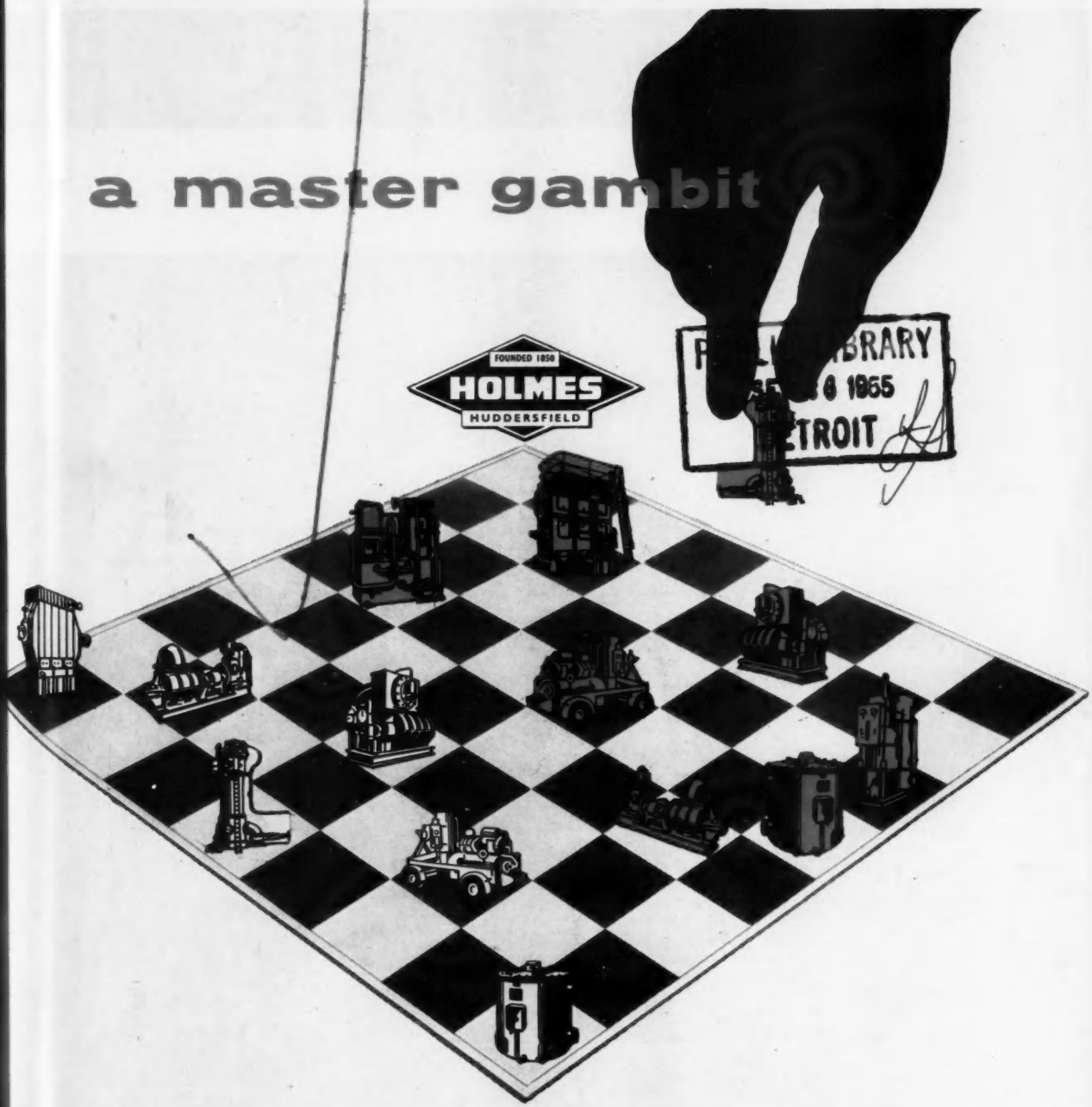
TECHNOLOGY DEPT.

# Gas Journal

VOL. 283. 107th YEAR. LONDON, SEPTEMBER 7, 1955 No. 4814 PRICE 1/3

a master gambit







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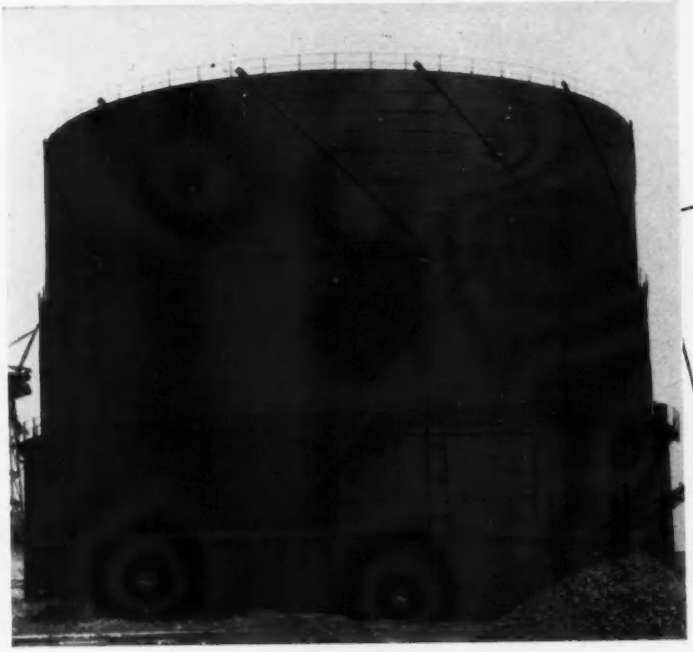

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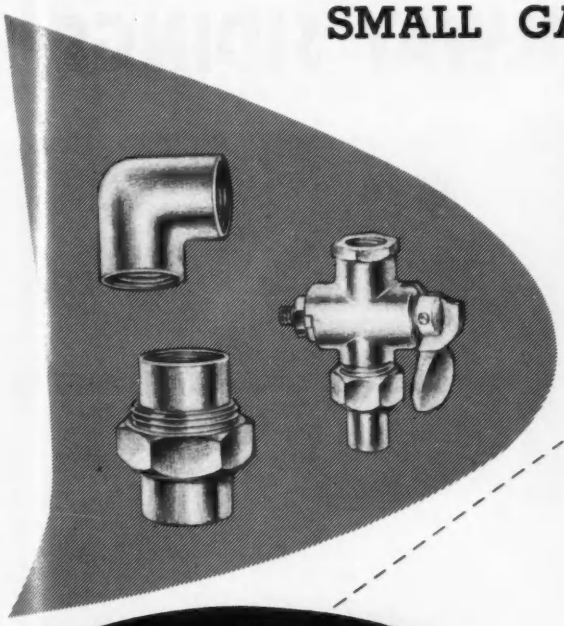

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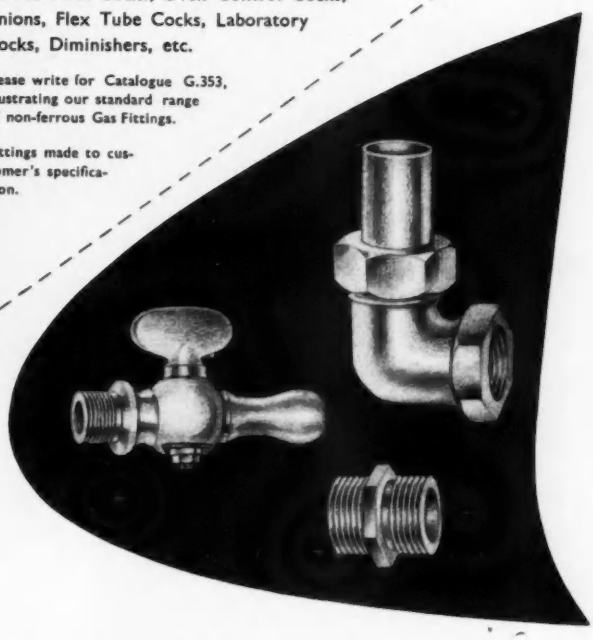

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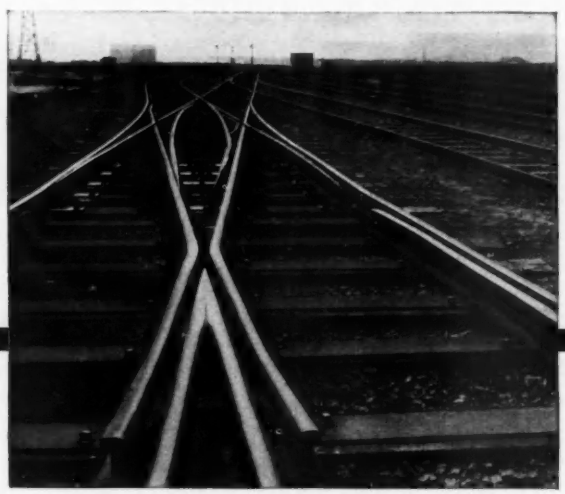

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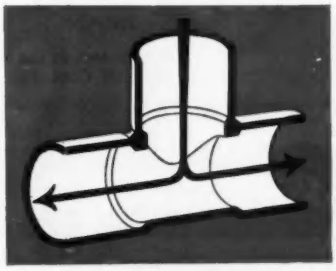

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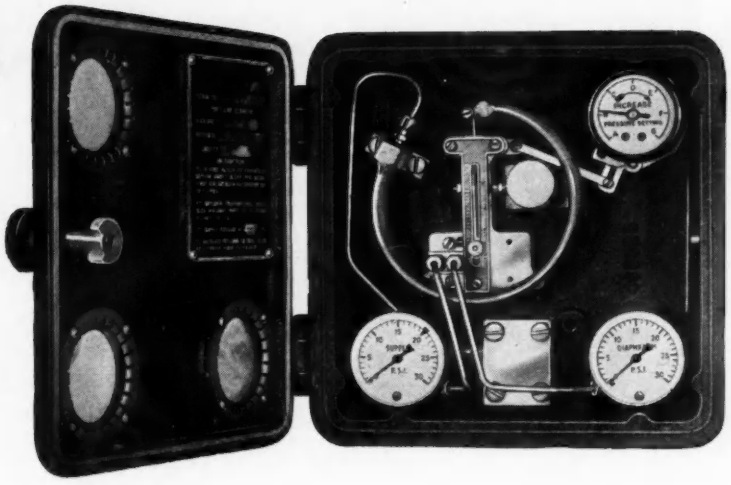

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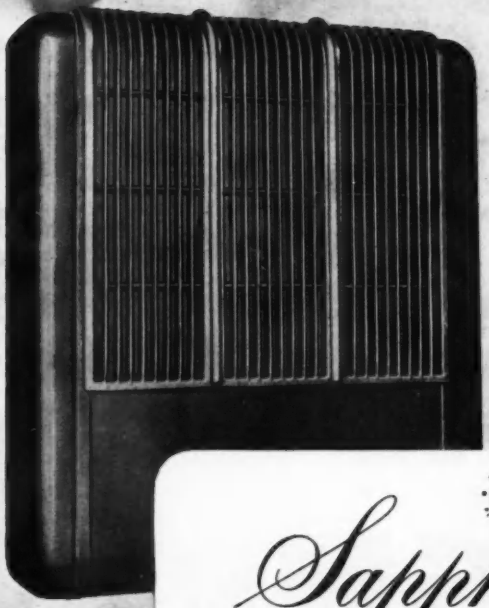

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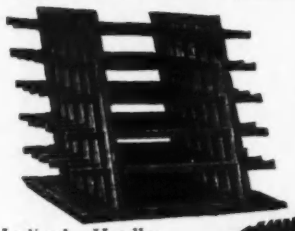

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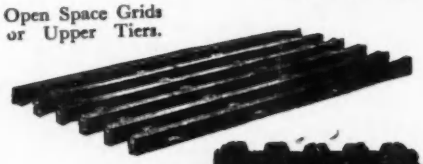

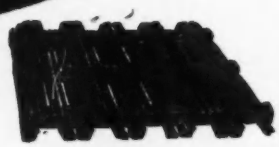

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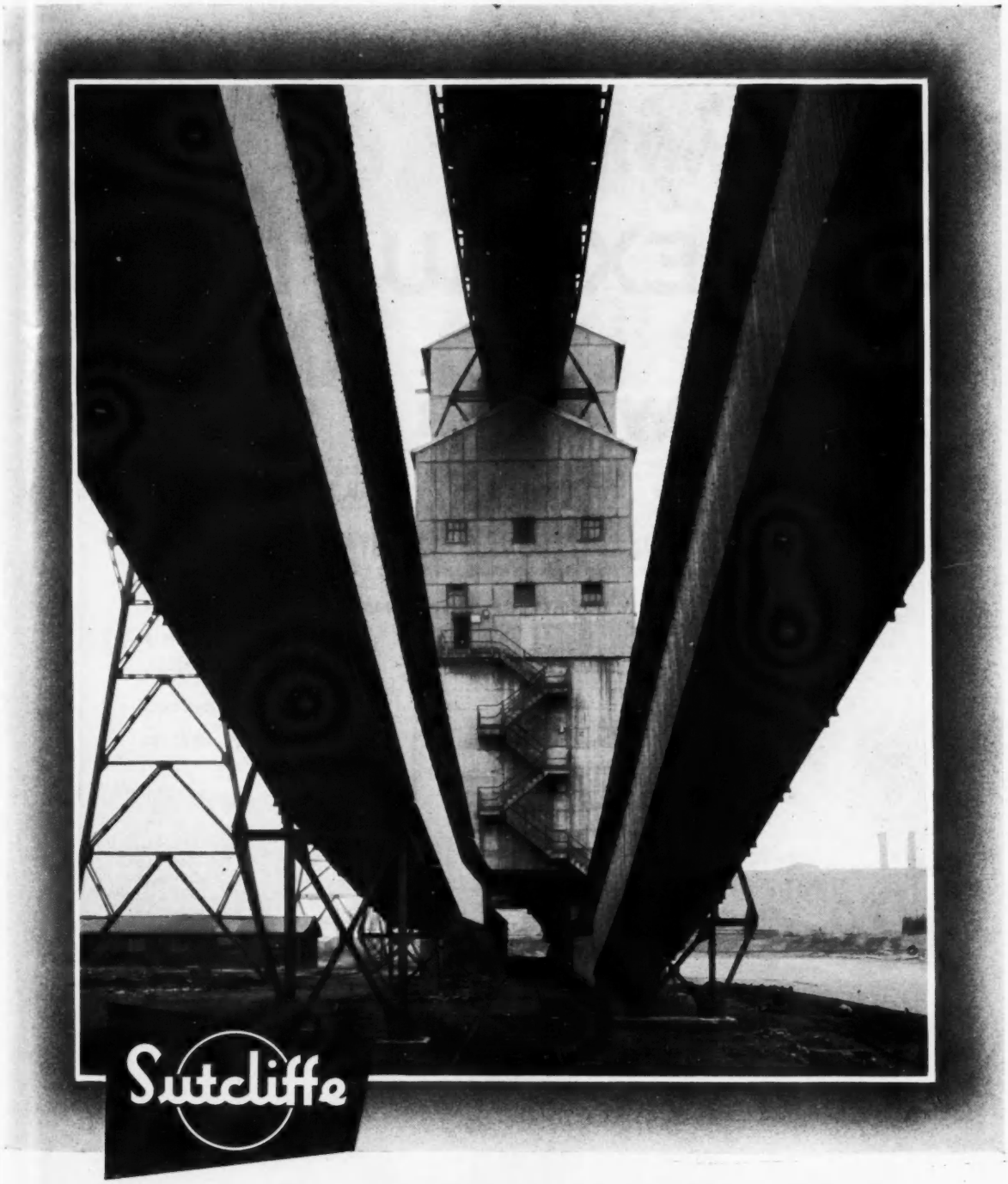


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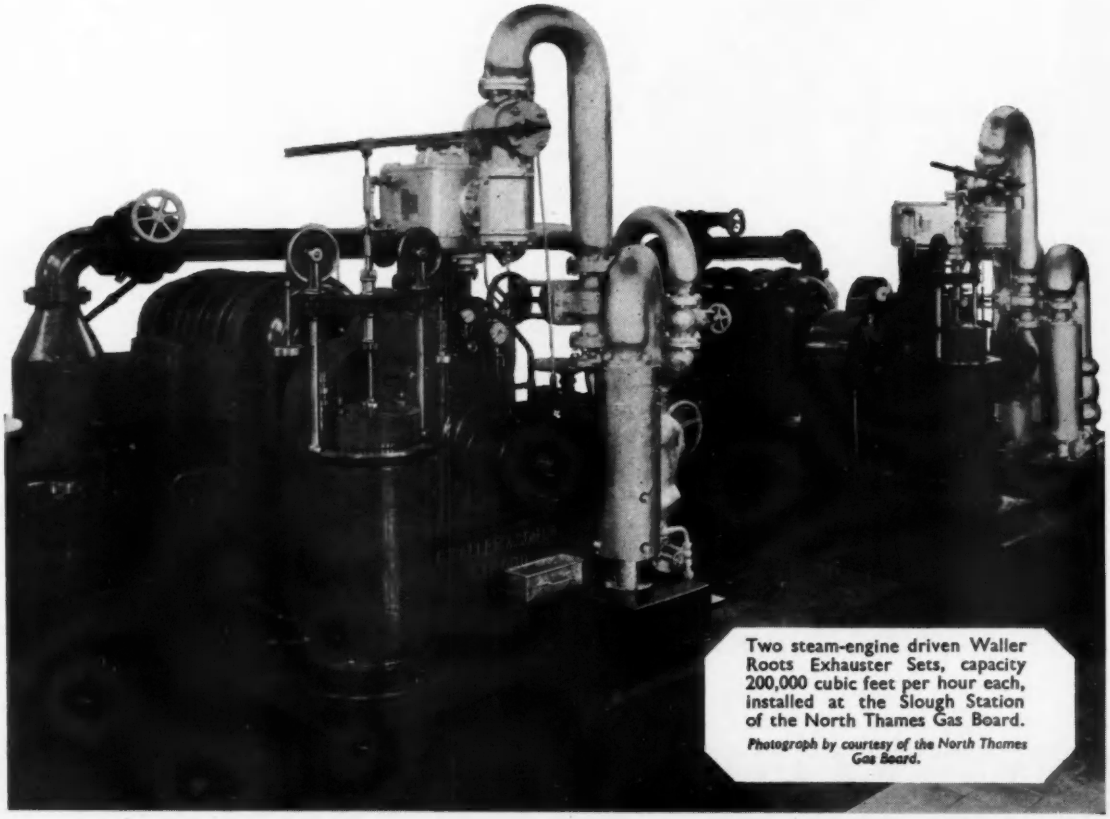

Two steam-engine driven Waller Roots Exhauster Sets, capacity 200,000 cubic feet per hour each, installed at the Slough Station of the North Thames Gas Board.

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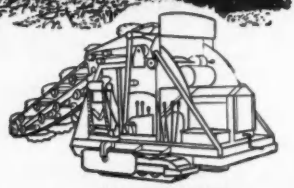

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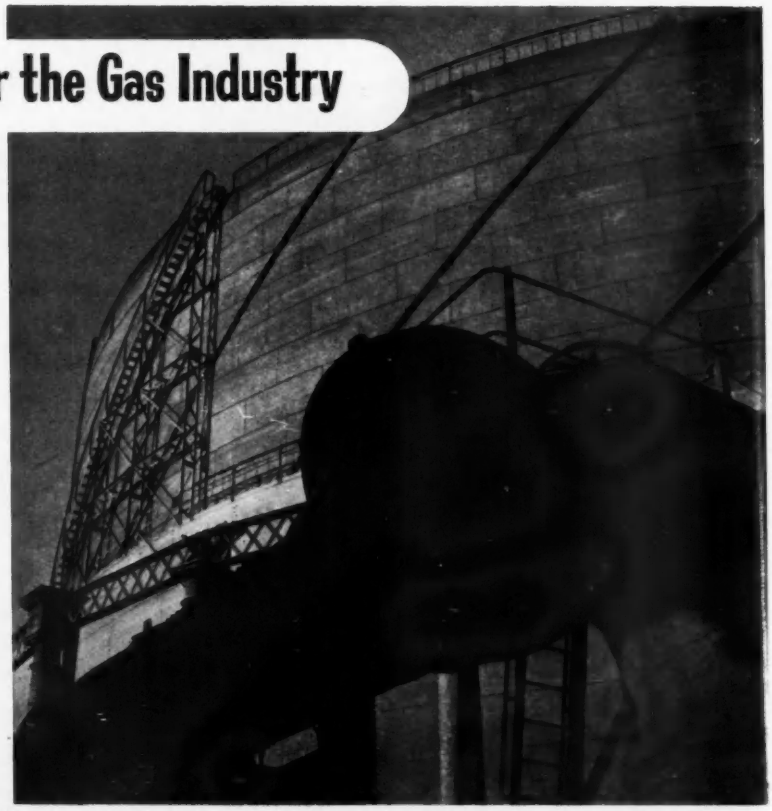

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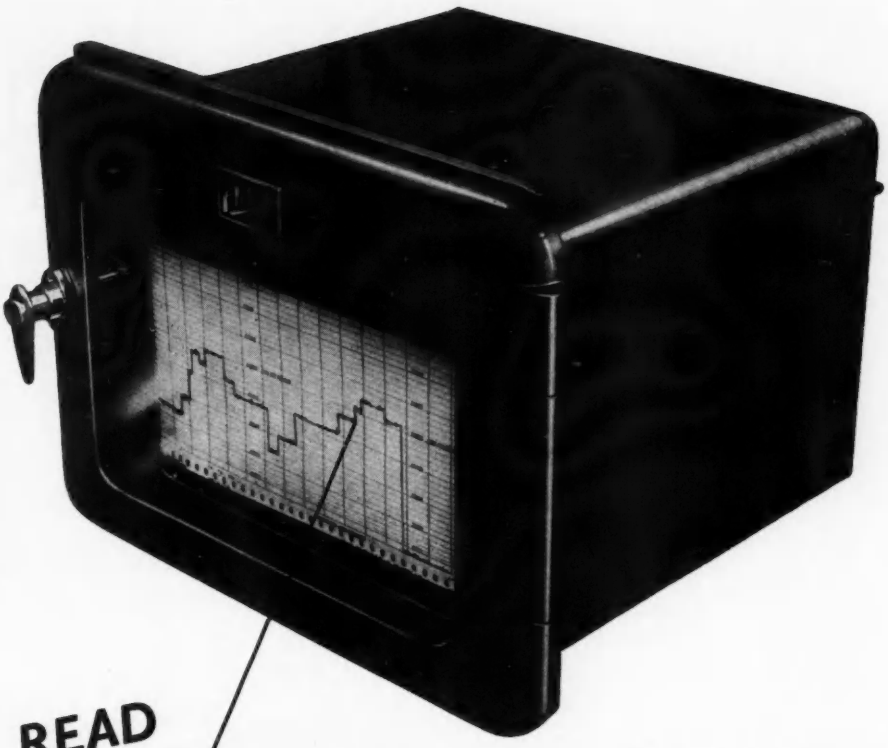

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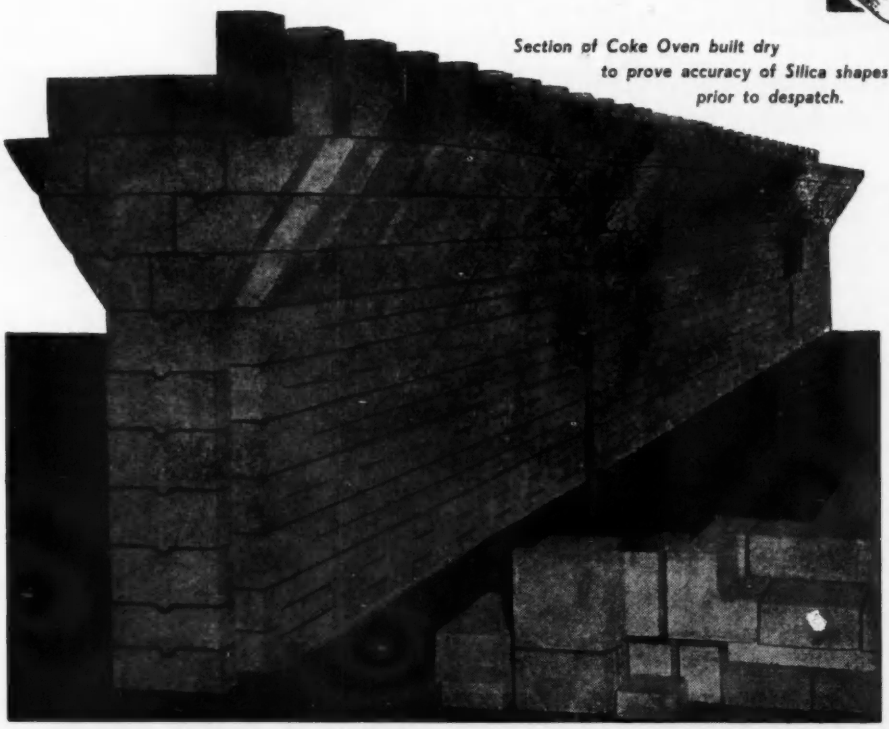

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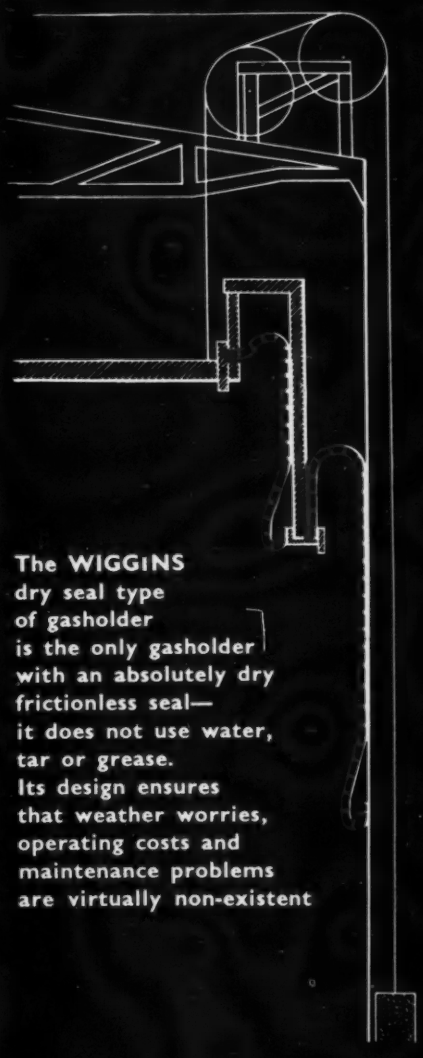

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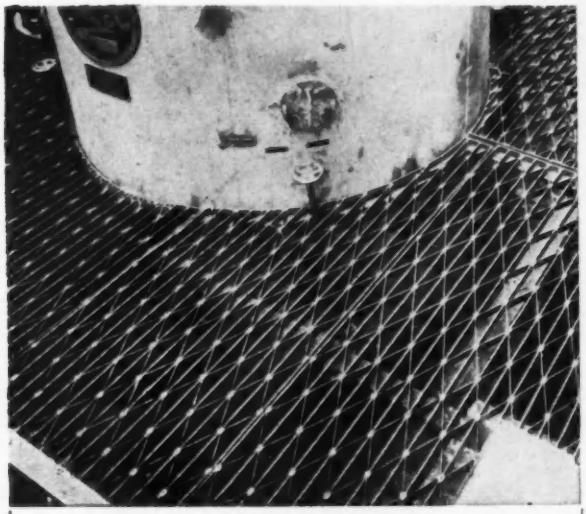

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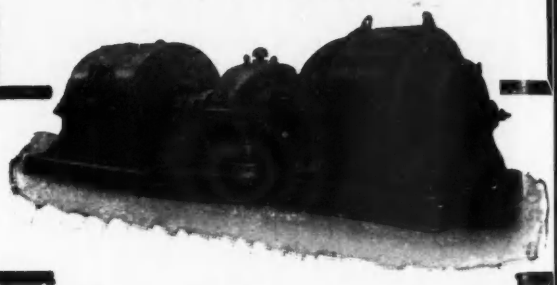

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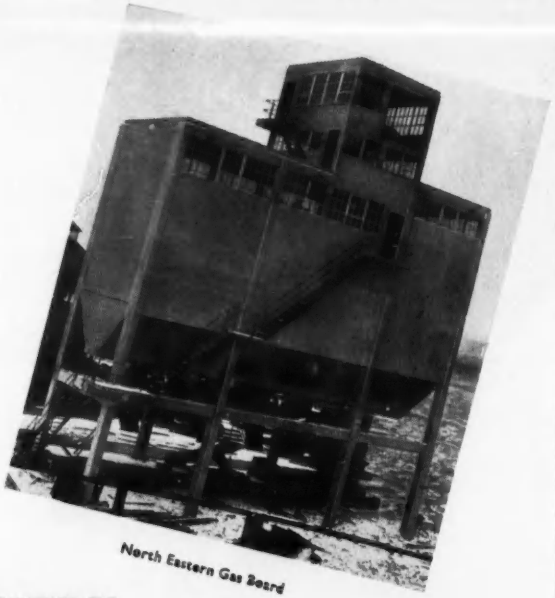

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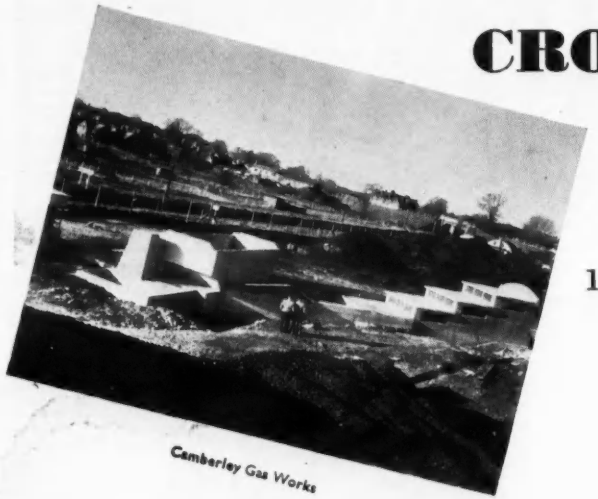

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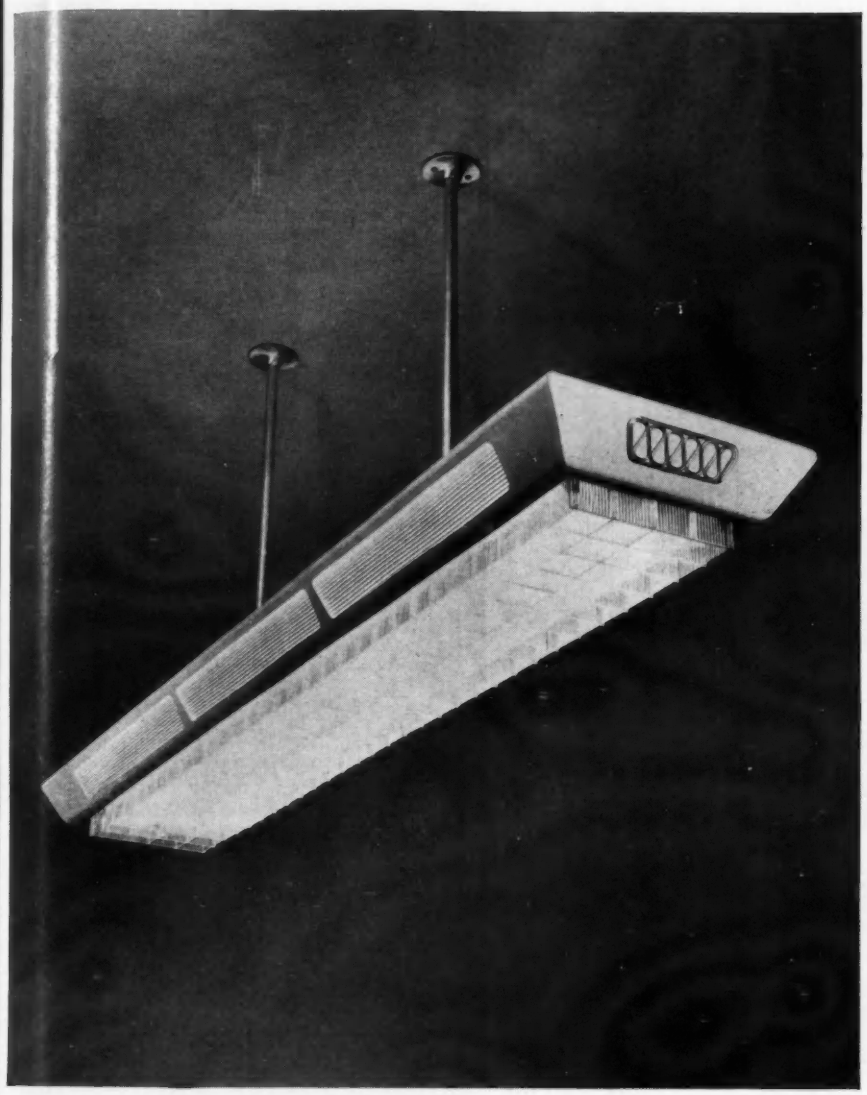

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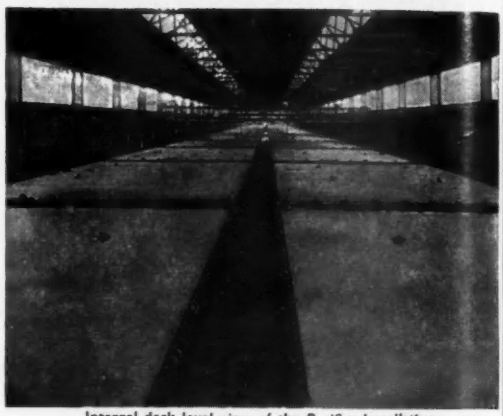
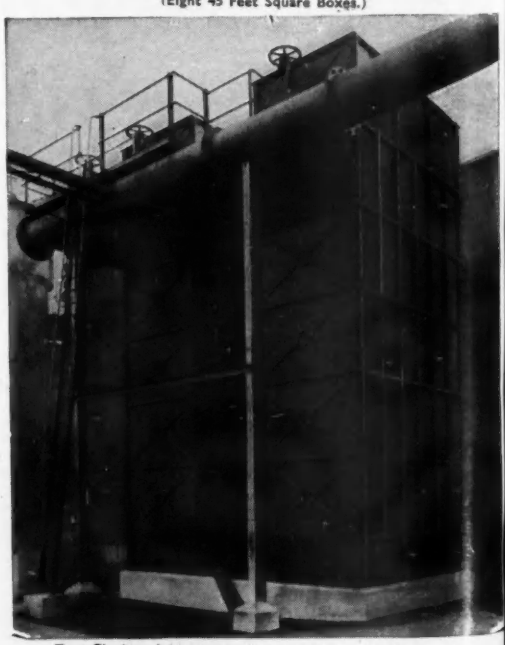
Two Clapham Barwick Pumpless Static Ammonia Washers



Internal deck level view of the Purifier Installation. (Eight 45 Feet Square Boxes.)



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*Double-Sided*

**OVERHEAD RADIANT GAS HEATER**

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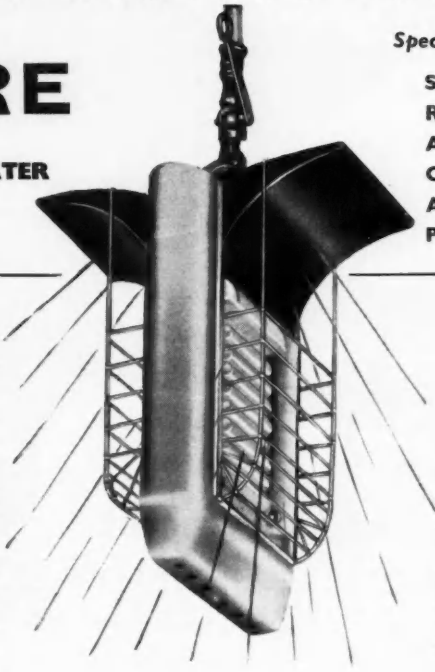

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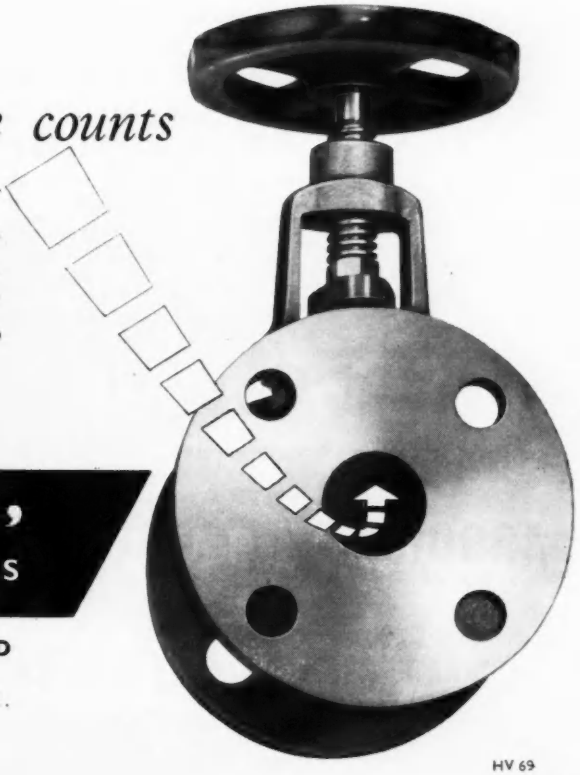

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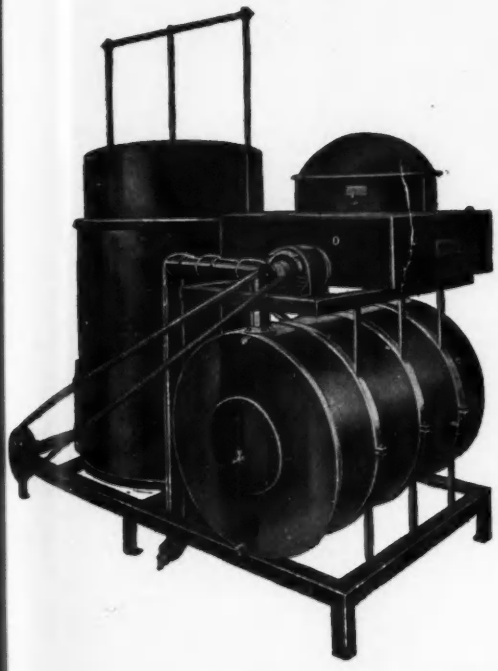

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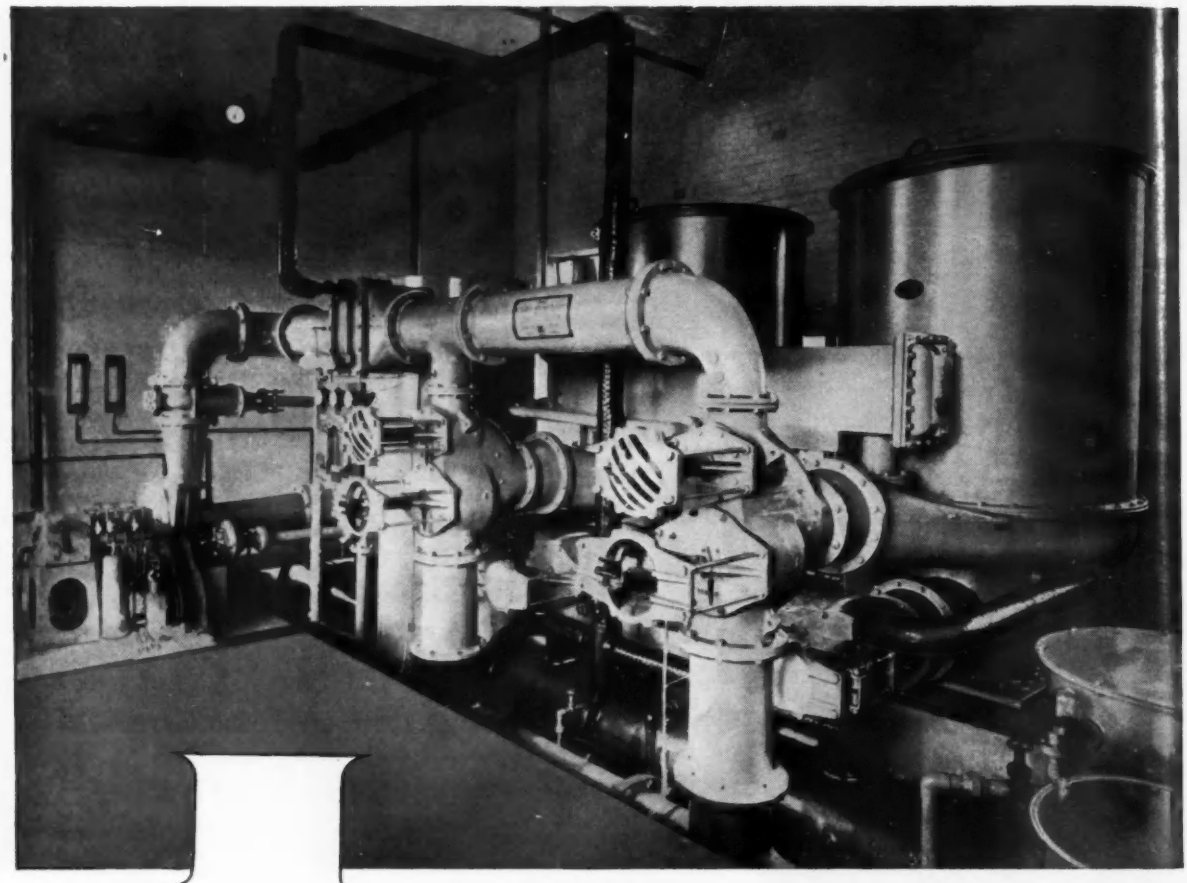

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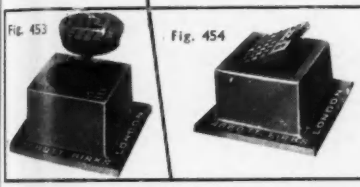
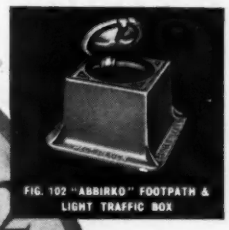



British Standard Gas Surface Boxes.



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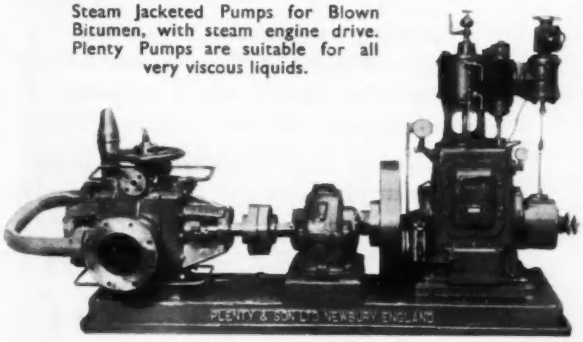


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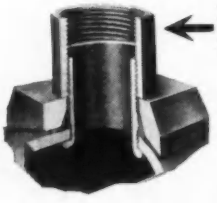
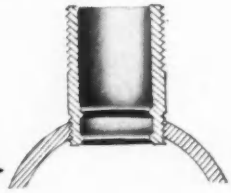


Parkinson Nipple with gutta-percha ring and C.I. saddle piece for steel mains.



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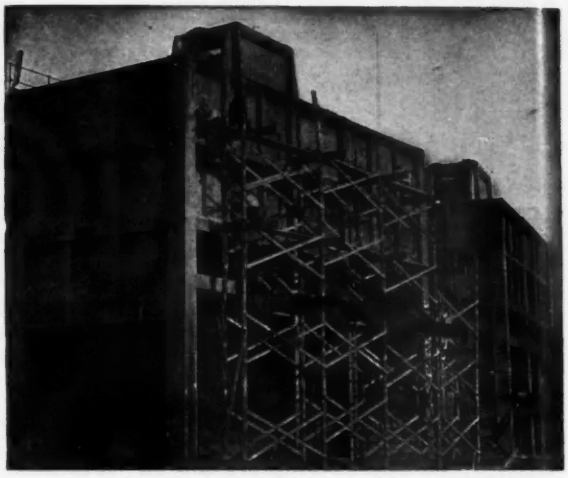

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Photograph by courtesy of the West Midlands Gas Board

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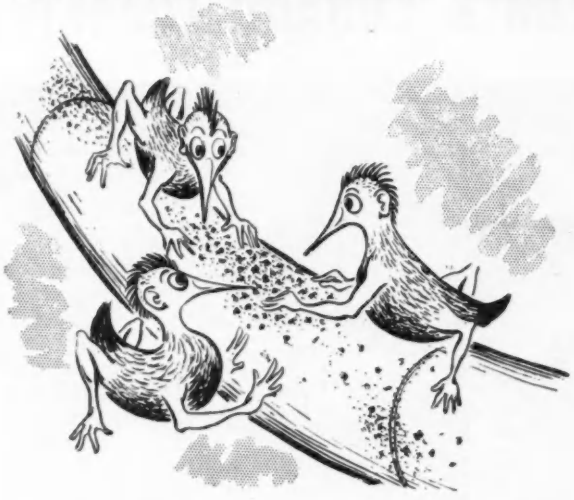

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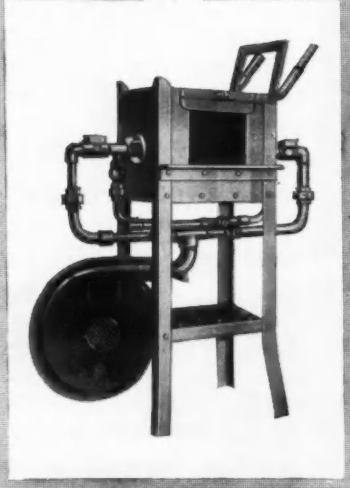

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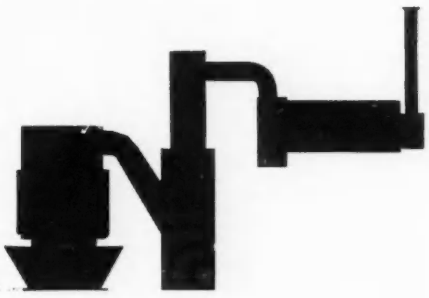

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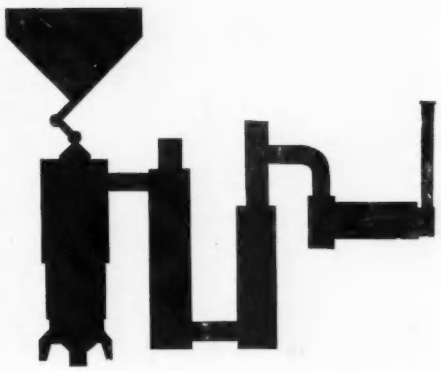

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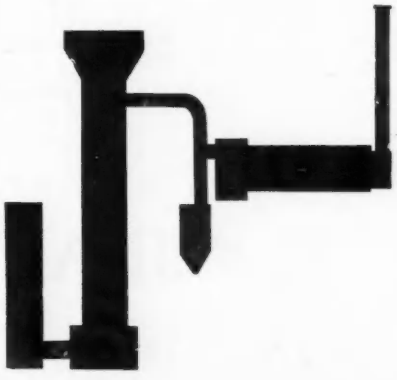

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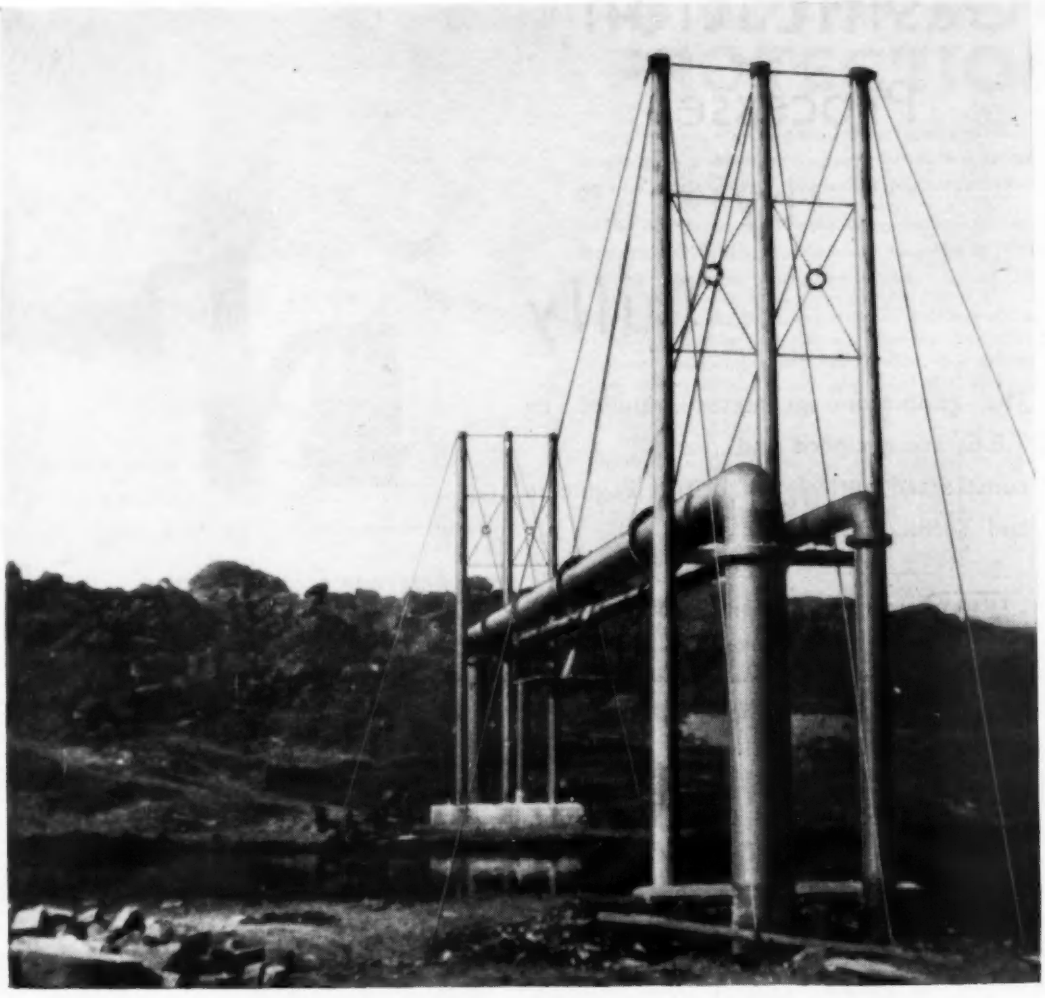

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# Gas Journal

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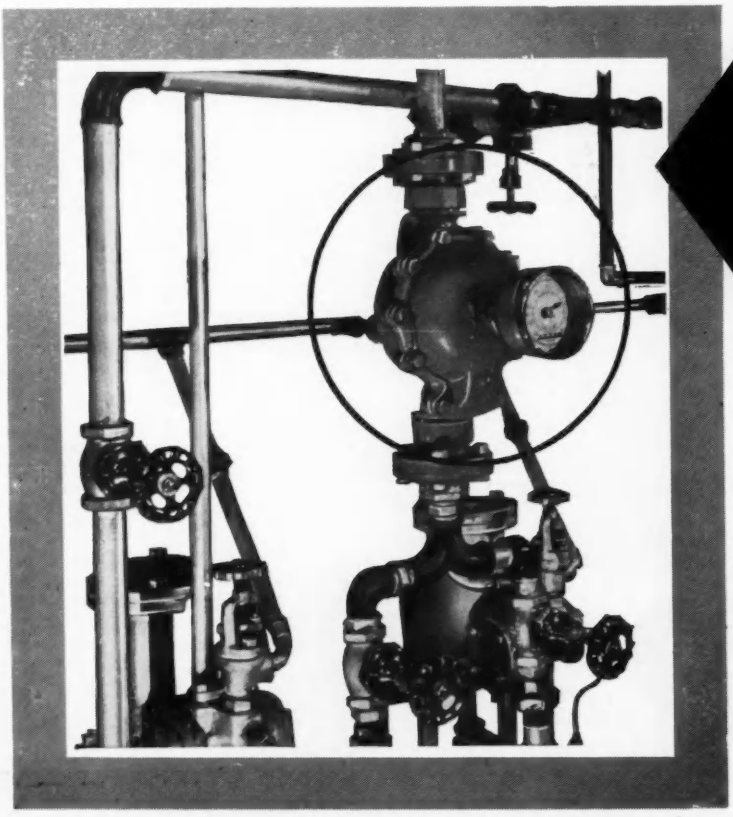

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# Gas Journal

VOLUME 283. No. 4814. SEPTEMBER 7, 1955. 107th YEAR

## *Nine-point Plan for Power*

IN earlier issues of 'GAS JOURNAL' we have commented upon the recent widespread increases in the price of gas. It is, of course, realized that these increases inevitably stem from increases in the price of coal, and we are pleased to note that our concern about this perplexing commodity has been felt by higher authority, and with some result. Recently recommendations have been made by the Engineering Industries' Association which are designed to prevent a repetition of the havoc caused to the nation's stability by these vicious price increases.

The Association says that immediate steps are necessary to ensure that a further crisis—a price increase or fuel shortage—does not arise next year, or the year after, to cause more damage to the national economy. The Association further suggests a nine-point plan which is aimed at preventing such an eventuality. The nine points are:—

(1) Make Exchequer grants to meet the extra cost of imported coal. This deficiency should be transferred from consumer to Government account in order to alleviate the serious inflationary pressure which has been brought about by the recent price increase.

(2) Secure better leadership at top levels within the N.C.B. organization and instil greater sense of responsibility and personal contact throughout the coal industry.

(3) Strengthen membership of N.C.B. by more part-time members with industrial experience and closer consultation with engineering.

(4) Concentrate mechanization at pits where capital expenditure will be most quickly effective.

(5) Encourage manpower.

(6) Consider the employment of foreign miners, including facilities for recruits to be accompanied by their families.

(7) Expedite development of alternative sources of power—atomic power, hydro-electric power, oil burning, electrification of railways, dieselization of railways.

(8) Expand the National Industrial Fuel Efficiency Service organization and provide additional service throughout the country.

(9) Encourage installation of fuel-saving equipment with 60% tax investment allowance.

We feel that the recommendation concerning Exchequer grants to meet the extra cost of imported coal could not be reasonably met unless the price to foreign buyers of our exported coal is proportionally increased to balance the grant. Our coal prices are, in fact, relatively low compared to those abroad, and it would not hazard our export market if increases were made, although, of course, it must be remembered that our coal exports are essential to enable us to procure imports from such countries and that, therefore, these increases should not be too drastic.

The Association, in its recommendation that the N.C.B. leadership should be improved, says that there is little evidence that the recommendations of the Fleck Committee are being implemented with the necessary vigour, and it urges that there should be stronger leadership at top level. One of the most difficult problems in the mining industry is that of diminishing manpower. The Engineering Industries' Association attaches great importance to the encouragement of labour influx to the mines, *e.g.*, by recruitment campaigns, priority for miners' housing schemes, re-housing and free removal where pits are closed, good apprenticeship schemes with opportunity of advancement to management level and improvement to the amenities of mining districts. A case in point arose recently in South Wales where the Coal Board is closing down the Brynhenllys Colliery which employs 193 men. All these men have been given notice. The N.C.B. claimed that the mine was being closed down due to inefficiency and lack of discipline among the men; they said that the management was thwarted at every attempt to impose discipline. Now it seems that the men will probably drift into other occupations and thus the coal industry's manpower will become further depleted. Lack of discipline seems to have become something of an occupational disease among coalminers since the industry was nationalised and it is probably with this in mind, that the Association recommends that the N.C.B. should allow more small low-shaft mines to be worked by independent operators under licence.

Concerning the Association's recommendations on the development of alternative sources of power, we were interested to note that they figure atomic power at the head of the list. This country has always been known for its courage in new ventures, and the Government has been praised for its enterprise in fostering the programme whereby 12 atomic power stations are to be built in the next 10 years. But there are almost 300

electrical power stations in this country most of which are fuelled by coal and most of which have been constructed during the last half century. Twelve new atomic power stations is, therefore, only just over 2% of the total number and it does not seem particularly venturesome to take 10 years to construct them. Atomic power has become immensely important and, as was seen at the recent Geneva Conference, of immense practicability. It is to be hoped that some notice will be taken of the Engineering Industries Association's recommendations and that there will be no further recurrence of the recent crises in coal. If increases in coal prices are threatened in the future, perhaps, by means of progress in the other fuel industries, they can be successfully repulsed.

## *Capital for the Gas Industry*

IN the absence of any clearly defined overall fuel and power policy it must be difficult indeed for the financial expert to appreciate the capital requirements of such national industries as electricity and gas. There is a querulousness of tone in some recent comment which would be funny if it were not, to some extent, tragic. Among the most interesting is an exchange of views between the *Manchester Guardian* and Mr. E. Crowther, Chairman of the Northern Gas Board.

It arose out of an article in *The Director* by Mr. Roy Harrod, who appears to assume that the principal public utilities were nationalised in order to act as 'the economy's shield by spending during slumps and holding off during booms.' He says that 'instead, their orders are being given a priority' which he considers dangerous. And when Mr. Crowther points out that the outlay of capital by the gas and electricity industries has been, and is, effectively determined not by themselves but by the insistent demands of their customers, the *Guardian* asks 'Does he really think that any business in the country is spending capital for fun?' To which one might answer: 'Well, not generally, but sometimes it looks a little like it.' But one does not want to go into TV and all that; nor into the somewhat lavish distribution of profits in certain quarters which goes some way in the direction of inflation. At any rate we fail to see any objection to Mr. Crowther's pointing out that demand for gas has 'expanded as industrial production has developed and as the housing programme has reached its peak.'

The suggestion is most unfair that, in some curious way, the nationalised industries are avoiding any 'contribution to the smoothing out of wild alternations of boom and slump.' And the statement: 'The reconstruction period in which they could claim priority on economic grounds is over,' has also an unfair slant. It may be that to a great extent the slack of maintenance in the war years has been taken up, but, at any rate in the gas industry, there is much plant which still needs modernization, modernization which would not only save money but, what is even more important, coal.

Even more sinister charges are thrown about in these comments. We are told that 'the failure of the nationalised industries to play their part in restraining the present boom which is endangering the nation's recovery is an event of first-rate political importance. It reveals that the public has lost control of these great services which were taken out of private ownership in order to be more amenable to public control.' Still keeping to the gas industry, these are extraordinary statements. Surely capital allocation to the gas industry, as always throughout its nationalised existence, is subject to Ministry control? And we do not see the slightest reason for the threats with which these charges are accompanied. 'The experience of 1955 may lead to drastic changes,' and 'ways will have to be found to make them conform more flexibly to the changing needs of the country.'

Really, these gentlemen cannot be allowed to have it both ways! It concerns electricity more nearly than gas that the American workman has three or four times as much power to his elbow as his British comrade. And if this situation is to be rectified the extension of generating plant must go on. What affects the gas industry is that if coal is to be conserved and, at the same time, vastly more solid smokeless fuel made available to implement a Clean Air Policy, then money must be spent on carbonizing plant and obsolete or inefficient plant must continue to be replaced.

It is true that if the nation's fuel and power policy had been planned well in advance it might have been possible to arrange new construction so as 'to have a contra-cyclical effect on the economy,' but so far new construction has barely made good the years which the war has eaten, and expansion cannot long be delayed. As Mr. Nabarro put it—'to turn to oil is not a policy, it is a desperate expedient.' It cannot be stressed too often—a national fuel policy is still to come, and it seems as far away as ever!

---

## *FUEL ECONOMY IN SCHOOLS*

THE days when gas could effectively compete for the school heating load are long past, and a further nail has been driven in our coffin by the publication of the Ministry of Education Building Bulletin No. 13 entitled *Fuel Consumption in Schools* (H.M.S.O., 2s. net). Its theme is that although most schools are occupied for only about 40 hours out of the week of 168 hours, it has not been common practice to close the heating system down to the minimum at nights and week-ends. Studies recently completed by the Building Research Station at the request of the Ministry of Education show that most school heating installations can be operated far more intermittently than they are at present, and that great savings of fuel can be obtained in this way. Maintained schools in England and Wales are using between 1½ and 2 mill. tons of fuel a year. Each annual school building programme is adding to this total at the rate of about 60,000 tons a year. To find out how fuel bills could be reduced experiments have been carried out over three years in a school which was specially equipped as a 'test bed.' The results of this research were checked against a field survey of fuel consumption in 160 post-war schools. The report draws conclusions from this work and makes suggestions about steps which can be taken by local education authorities to save fuel in existing schools as well as in new installations.

Three different types of heating system were studied: Forced warm air, radiators, and floor panels. Under present practice, fuel consumptions are considerably higher in nearly all cases than calculations based on the experimental data show to be necessary. Both the field and the experimental evidence, however, agree in indicating that

because of the inherent nature of the three systems their relative order of economy is forced warm air, radiators and floor panels. It is suggested that this fact must be borne in mind when selecting the system for new installations, but in existing schools as well much is to be gained by installing and correctly using control instruments of types which are readily available. The point is made that the price of fuel is not a factor which by itself determines the order of economy of the three systems; this is mainly governed by their inherent modes of operation. Respective fuel prices, however, can and should influence the method of firing any one system. 'In particular,' says the report, 'oil-firing of radiators would seem to be a promising alternative to coal-firing, where coal prices are relatively high, say, over 90s. per ton, or even where coal prices are somewhat lower, if the oil-fired radiator systems are used more intermittently than was the case in the field survey.' And the report goes on to conclude that, 'systems using gas and electricity involve costs which would seem prohibitive for schools.' On the other hand it was noted that coal-fired radiator systems showed average consumptions some 25% greater than those for coke-fired radiators, which fact was described as being 'an unexpected reversal of previous assumptions.' The report, which is extremely detailed and well produced, has one serious omission—it gives virtually no consideration to the important factors of manpower and convenience of operation, both of which must be considered when assessing the merits of different heating systems.

## *OXFORD PLAN*

MR. DUNCAN SANDYS, Minister of Housing and Local Government, has approved, with minor modifications, the development plan for the City of Oxford, and has expressed to the Town Clerk the hope that the City Council will ensure that work on the first stages of the scheme is started without delay. The approved plan, which is being placed in Oxford Town Hall for inspection by the public, provides among other matters for the removal of the Oxford gasworks from its present site. Before nationalisation the former Oxford Gas Company prepared plans for extensions on the existing site, and when the Southern Gas Board took over on vesting date it was faced with the fact that demand was outstripping supply and that the House of Lords had overruled sanction for any further development of the present works. To help in solving its difficulties the Board proceeded to lay a bulk supply main from Reading to Oxford, but the need for increased gas making plant still persisted. Details of the new plan, which will provide for Oxford for the next 20 years, were published early in 1953, and a public enquiry was held in the following December. The Gas Board explored the possibilities of alternative sites as indicated by our recent reproduction of an artist's drawing of a large new vertical retort installation for which contracts have been signed. An entirely new works at Cowley, where there is to be a new town centre, was planned.

The main proposals under the plan include preservation of the existing character of Oxford as a university city, while ensuring that it continues to fulfil its other functions as a regional centre, county and market town, industrial city, and tourist centre. In all these respects its demand for gas is likely to increase notwithstanding a planned gradual decrease in population by re-development and abatement of overcrowding. An overspill of some 16,000 inhabitants will have to be housed outside the present boundaries. The new gasworks has been designed with all these developments in mind, and although for some time to come Oxford will have to depend on Reading for part of its supplies it is expected that the erection of the new works will at least keep in step with the carrying out of the plan, certain aspects of which—for instance the compulsory acquisition of land—still remain subject to the holding of enquiries into objections.

## IMPACT OF SCIENCE ON MANAGEMENT

The British Institute of Management announces that its 10th National Conference will be held at Harrogate from November 2 to 4. Speakers who have already accepted invitations include Mr. John Diebold, American pioneer of the application of 'automation,' Sir Geoffrey Vickers, V.C., and Sir Charles Goodeve, O.B.E., F.R.S., Director of the British Iron and Steel Research Association. Provision is being made for 1,000 top managers to be received at Harrogate as delegates to the conference and a programme is being prepared which will include two plenary sessions and 24 sectional meetings devoted to specialized aspects of management. So fundamental are the changes with which scientists are confronting industry at the moment that many people are talking in terms of a second industrial revolution. At the same time it is obvious that the face of Britain cannot be transformed overnight. The discoveries of the scientist must be translated into the practice of everyday living. The responsibility for transferring new knowledge from the research laboratory to the production floor must rest with management. It is therefore important that opportunities should be created for scientists and managers to discuss together the form in which the promised changes should develop, so that the forces of evolution may be speeded and the forces of revolution made effectively productive. The British Institute of Management has therefore chosen as the theme of its Conference 'The Impact of Science on Management in the Future.'

## MODERNIZATION BY GAS AND COKE

The passing of the Housing Repairs and Rents Act, 1954, enables property owners to obtain financial grants for the conversion of large houses and other buildings into properly equipped flats or for the improvement of sub-standard property, in agreement with the tenant, by the provision of such domestic amenities as adequate provision for cooking and heating, and the installation of baths, washing facilities and running hot water. A new brochure entitled *Houses and Flats Before and After Modernization by Gas and Coke*, published by the Gas Council, 1, Grosvenor Place, London, S.W.1, but also available from area gas boards, describes how the gas industry can assist in the provision of comfort to homes formerly lacking such amenities. After outlining the conditions for grants under the Act and the method of obtaining them, the booklet describes the gas appliances which can be installed for cooking, the provision of hot water, home laundry, food storage and space heating. It is illustrated with plans of simple conversions and photographs showing property which has been improved in the way suggested.

## INCREASE IN SUBSCRIPTION RATES AND SINGLE COPY PRICE.

We regret that continuing heavy rises in production costs and overheads compel us to increase our subscription rates as from October 1, 1955. The new annual advance subscription will be:—Home and Empire 60s.; Foreign 70s. The price of single copies will be 1s. 6d. (by post 1s. 8d.) as from that date.

*The new rates will apply to existing subscribers when their current subscription expires.*

# Personal Notes

MR. W. G. SHEARER has succeeded MR. G. A. PHILLIPSON as Coke Oven Manager at Ebbw Vale.

MR. W. O. KIRKWOOD, General Manager of the Sunderland Division of the Northern Gas Board, is a keen horticulturist, and he scored a notable success at the Division's annual flower and vegetable show by winning three first prizes, a second, third and special award. The W. O. Kirkwood trophy, presented for most points at show, went to MR. R. PEART, of Stanley, for the second year in succession.

MR. E. BARNARD, C.B., C.B.E., D.S.O., retired from his position as Deputy Secretary in the Department of Scientific and Industrial Research on August 31, 1955. Mr. Barnard, who is 63, joined the Department of Scientific and Industrial Research as an Assistant Principal in 1919.

MR. C. J. B. SAWBRIDGE was recently appointed Assistant Chief Accountant to the South Eastern Gas Board. He has been in the gas industry for more than twenty years, having joined the Eastbourne Gas Co. in January, 1935, as chief clerk and accountant. He became Assistant Secretary in April, 1939. From July, 1947, he was General Manager and Secretary of the Eastbourne Gas Co. and also Secretary to and Heathfield Gas Co., Ltd. He takes up his present position at the Croydon Headquarters after having been accountant to the Sussex division of the Board for just over six years.

MR. JAMES CAMPBELL, of Elmbank Street, Ayr, has been presented with a standard lamp and magazine box to mark his retirement from the gas industry after serving at Newton-on-Ayr for 36 years.

MR. THOMAS F. SCOTT, who has been manager of the gasworks at Linlithgow, West Lothian, since September 1, 1947, has been appointed engineer manager of a private gas company at Portadown, Northern Ireland. Mr. Scott is a native of Leslie, Fife, and was educated at Kirkcaldy and Glasgow Technical College. He took a prominent part in the life of Linlithgow and two years ago was elected to the Town Council.

SIR ANDREW BRYAN, who is a member of the National Coal Board, has been co-opted to the Council of the British Institute of Management. This action follows the retirement from the Coal Board of SIR GEOFFREY VICKERS, V.C., who will continue to serve on the Council in his personal capacity. Sir Andrew was appointed Chief Inspector of Mines in 1947, a position that he continued to hold until 1951 when he became a member of the Coal Board. He is a Member of Council and past President of the Mining Institute of Scotland and a past President of the Institution of Mining Engineers and of the National Association of Colliery Managers.

# Obituary

MR. HARRY JAMES YATES, founder and first Chairman of Radiation, Ltd., died on August 28, in his 82nd year. At an early age he was interested in scientific development, including the early stages of X-ray research, and in 1893 commenced his career in the gas appliance industry when he bought the business of Arden Hill as a young man of 21. His first big invention appeared in 1894—a gas cooker with removable burners for the hotplate and oven, which revolutionized gas cooker design and began the era of great development in this important branch of the gas appliance industry's business. His experience in the industry had convinced him of the advantages which would follow a closer association of the leading gas appliance manufacturers, and this culminated in the formation of Radiation, Ltd., in 1919. One of his first moves was to equip the combine with the very best possible facilities for research. Radiation House, London, was acquired, and laboratories for pure research work were established there. As a result of the work carried out in the research and demonstration kitchens at Radiation House, 1923 saw the introduction of the New World Regulo-controlled cooker—the culmination of years of gas cooker research work in which Mr. Yates had a close part.

# Diary

**September 9.**—SCOTTISH JUNIORS (Western District): Opening Meeting, 52nd Session, Gas Showrooms, 522, Sauchiehall Street, Glasgow. 6 p.m.

**September 9.**—MANCHESTER AND DISTRICT SECTION, I.G.E.: Visit to the works of the Derbyshire Silica Firebrick Co., Ltd., Friden, Hartington, near Buxton.

**September 12-14.**—GAS COUNCIL: Gas Sales and Service Conference. 'Heads of Ayr' Holiday Camp, Ayr. (For programme see 'JOURNAL,' July 20, p. 209.)

**September 13-16.** — ASSOCIATION OF PUBLIC LIGHTING ENGINEERS: Annual Conference, Folkestone.

**September 19.** — WEST MIDLANDS G.C.C.: Committee Room, Gas Offices, Edmund Street, Birmingham 3. 2.30 p.m.

**September 19-20.**—EASTERN SECTION, I.G.E.: Annual General Meeting, Chairman's Address, W. A. Evetts; 'Some Problems involved in the Manufacture and Distribution of Gas,' B. Wilkinson; Grand Hotel, Sheringham.

**September 21.**—MANCHESTER JUNIORS: Visit to K.L. Cranes, Ltd., Letchworth.

**September 22.** — STANTON IRONWORKS CO., LTD.: Mr. Geoffrey Lloyd, Minister of Fuel and Power, opens coke oven extensions.

**September 22.**—SCOTTISH ASSOCIATION OF GAS MANAGERS: Annual General Meeting, Town Hall, Inverness.

**September 24.**—EASTERN JUNIORS: Presidential Meeting, Norwich.

**September 28.**—IRISH GAS ASSOCIATION: Annual Meeting; Presidential Address, S. L. Doyle (Cork); 'Gas Distribution,' A. L. Allen and J. J. Mahoney; Imperial Hotel, Cork, 10.30 a.m.; afternoon outing to Blarney Castle; annual dinner, Imperial Hotel, 7.30 p.m.

**September 29.**—NORTH THAMES G.C.C.: Westminster City Hall, 2.30 p.m.

# Calendar & Directory Alterations

The following changes have been notified during the past month. To keep the information in the current 1955 edition of the GAS JOURNAL CALENDAR AND DIRECTORY up to date readers are invited to note these alterations in the Directory Section.

**Page D24.** SOUTH EASTERN G.C.C.: Mrs. H. S. Mair, Seaford, Sussex, *Deputy Chairman*, vice Mrs. D. N. Rathbone. SOUTH WESTERN G.C.C.: Mrs. B. J. Shell, Melksham, Wiltshire, *Deputy Chairman*, vice Miss J. Stephen.

**Page D47.** HULL GROUP: A. Cole, *Group E., and Deputy Group G.M.* SPENBOROUGH DISTRICT: J. Gaunt, *District E. & M.*, vice A. Cole.

**Page D51.** NORTH THAMES GAS BOARD: T. V. Garrud, *Controller of Services*, vice W. S. Gooch; G. H. W. Madge, *Assistant Commercial Manager.*

**Page D57.** CENTRAL DIVISION: C. Pearson, *Divisional M.*, vice A. F. Hetherington. SOUTH WESTERN DIVISION: W. D. Ellis, *Divisional M.*

**Page D78.** EAST SURREY DIVISION: Delete P. Richbell, *Distributing E.*, retd.

**Page D85.** TORQUAY: O. Pincock, *District E. & M.*, vice J. E. Wilkes. WESTON/TAUNTON: Delete O. Pincock, *Distribution E.*

# FLUID COUPLINGS AND GASWORKS MACHINERY

*By L. J. Clark, B.E.M., M.Sc., Development Engineer,*
*North Thames Gas Board.*

FOR numerous gasworks duties, fluid couplings have found useful application, serving either as constant or variable torque converters according to the torque/speed requirement of the driven machine. In this way variable speed drives can be obtained, torsional vibrations eliminated, smooth acceleration assured, and overloading safeguarded.

### Types of Fluid Coupling

The two main types of fluid coupling are the traction and the scoop control types. The former transmits constant torque for a given input speed, and the latter a variable torque, depending upon the position of the scoop. All couplings consist essentially of a centrifugal pump impeller driven by the prime mover and operating in a closed fluid circuit with a turbine runner which is in turn coupled to the driven machine. The elements of a coupling are shown in Fig. 1. From this, the similarity between the coupling components and a conventional centrifugal pump impeller and turbine runner are evident. The main difference lies in the fact that the fluid, instead of flowing radially from the impeller, is turned through 90° and discharged axially straight into the turbine runner. With this arrangement the volute or diffuser losses which normally occur in a centrifugal pump are avoided as the high pressure fluid flows directly at high velocity into the turbine runner. Consequently, the hydraulic efficiency of the system is high and the overall efficiency of power transmission normally exceeds 90%.

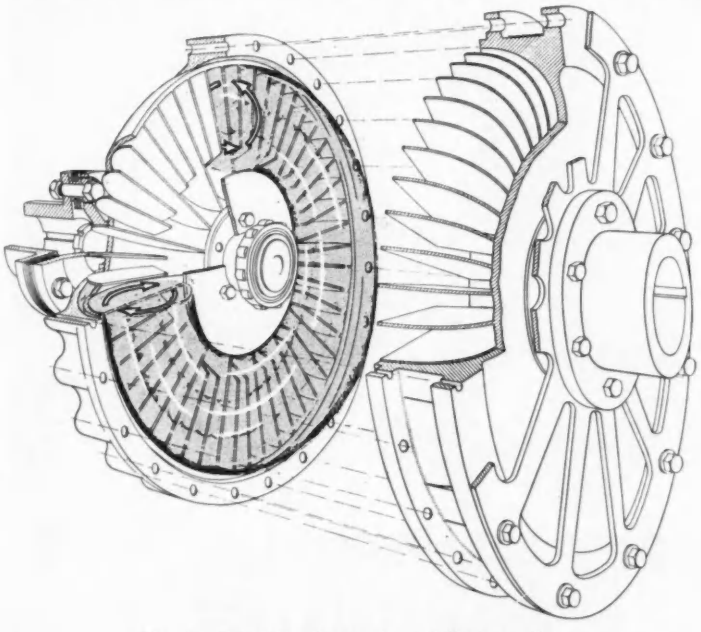


*Fig. 1. Principle of operation of fluid coupling.*

The fluid pressure developed by the impeller varies as the square of its speed, while the torque transmitted varies in direct proportion to the pressure. As a result the torque transmission characteristics of a coupling follow the normal square law when related to input speed and with the output runner stationary. Thus, as the speed of the motor or engine supplying the power increases after the initial starting, the torque transmitted rises as the square of the engine speed. In addition, since the torque is proportional to the pressure and the mass flow, it is affected by the degree of oil filling in the coupling. These relationships are illustrated graphically in Fig. 2.

In the case of an electric drive by a squirrel cage induction motor, the normal torque/speed characteristic of the motor can be superimposed on the coupling curves as in Fig. 2. This shows that during the acceleration period only a limited proportion of the motor torque is transmitted to the drive, leaving the remainder to accelerate the motor itself. In this way, the motor accelerates quickly and the duration of heavy starting current is reduced. When the motor is up to speed its full power becomes available to transmit a high and steady torque to accelerate the main drive. The result is that the motor runs up to speed very quickly under light load conditions, while the main machinery is accelerated more slowly, but nevertheless at a faster rate than with a direct coupled motor drive. The variation of transmitted torque as the driven member of the coupling accelerates is shown in Fig. 3. This shows that at all degrees of coupling filling the torque builds up gradually from the stalling value to a maximum in the region of 50 to 75% of machine speed, after which the torque drops to the full load value at 100% machine speed. By such use of fluid couplings it is possible to utilize motors with lower starting torques and lower starting currents and in the case of high power drives the savings that can be made in the electrical equipment including cabling more than offset the cost of the coupling. In addition, the smoother acceleration imparted to the driving machinery brings with it benefits of greater mechanical reliability, sweeter operation, and it frequently reduces overall cost.

For a given oil filling any fluid coupling transmits a substantially constant torque for variable output speeds. This means that if the output shaft is running at half the input shaft speed approximately half the input power of the coupling will be dissipated in heat in the oil comparable with the heat lost by a slip-ring motor. In some cases, however, the power required by the driven machine falls rapidly as the speed is reduced and the loss of power in the coupling may become insignificant in relation to the full load power requirement.

### Variable Speed Drives

For many gasworks applications such as fans, boosters, exhausters and pumps, variable speed drives are required. These

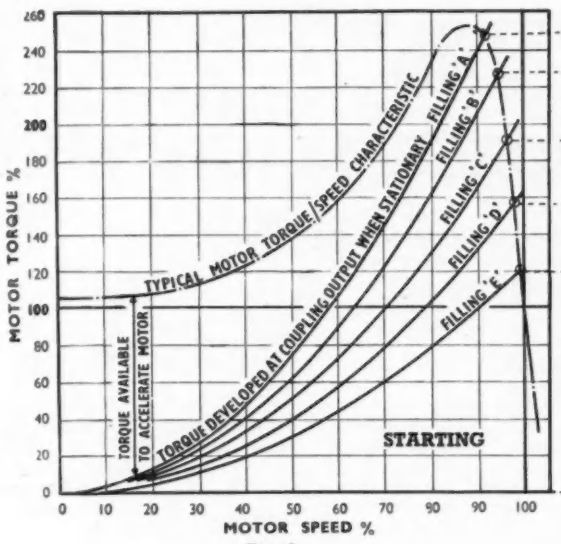



Fig. 2.

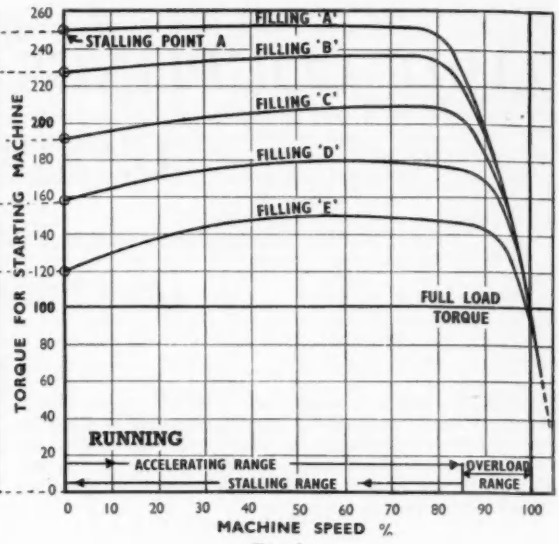



Fig. 3.

*Combined characteristics of direct-on started standard squirrel cage motor and traction type fluid coupling.*

can be provided by variable speed A.C. or D.C. motors, by diesel engines with long range governors and by steam turbines or engines. All of these prime movers are, however, more expensive and complicated than the simple and robust squirrel cage motor which can be made to provide variable speed by incorporating a scoop control coupling.

In the design shown in Fig. 4 a reservoir of oil is contained within the cylindrical casing which surrounds and revolves with the impeller of the coupling. By means of the sliding scoop, oil can be transferred from the reservoir to the working circuit, while leak-off nozzles permit a constant discharge from the working circuit to the reservoir. For each position of the scoop tube a new equilibrium is established between the relative quantities of oil in the coupling and in the reservoir so that as the effective radius of the scoop is increased more oil is transferred from the reservoir to the coupling. In this way the torque transmitted to the output shaft with a constant input speed can be varied from zero to the maximum stalling torque provided by the coupling design.

In practice, the speed of the output shaft would adjust itself until the torque absorbed by the driven machinery matched the torque transmitted by the coupling, thereby providing a variable speed drive. The change of speed, however, is a secondary effect consequent upon a specific change of torque associated with a change of oil filling. The losses in a fluid coupling vary in direct proportion to the slip so that when the output shaft is running at approximately half the input shaft speed the efficiency would be in the region of 50%. Thus for drives requiring variable speed, but at approximately constant torque, the fluid coupling would prove to be inefficient at reduced speeds. Further, it cannot be expected at any particular scoop setting to hold a predetermined reduced speed very accurately, especially if the transmitted torque changes. If precise speed control is required, an automatic regulator can be provided which will adjust the scoop setting to hold any particular speed.

In the case of centrifugal machines such as fans and boosters, the power consumption usually varies as the cube of

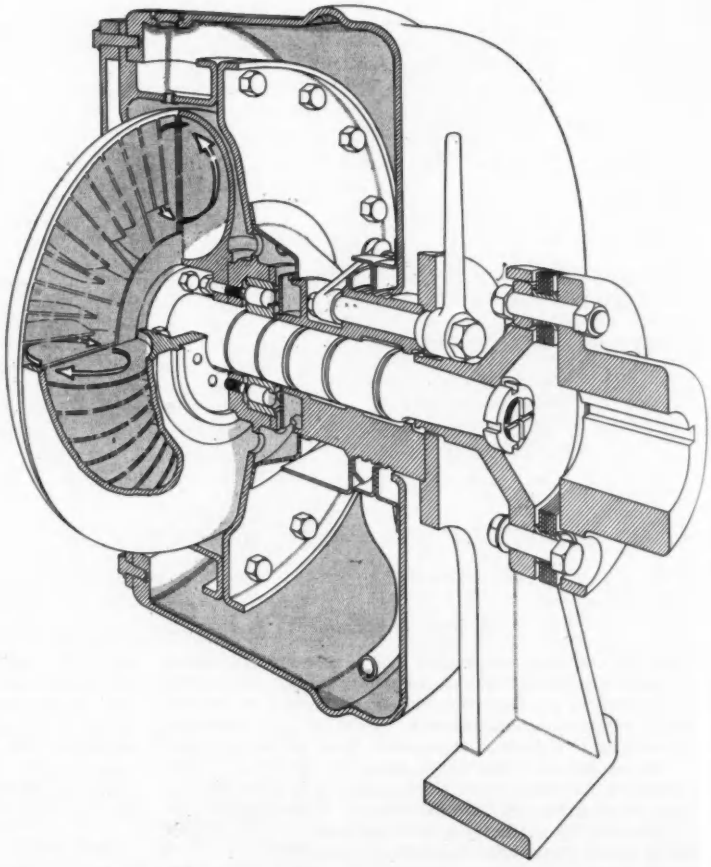
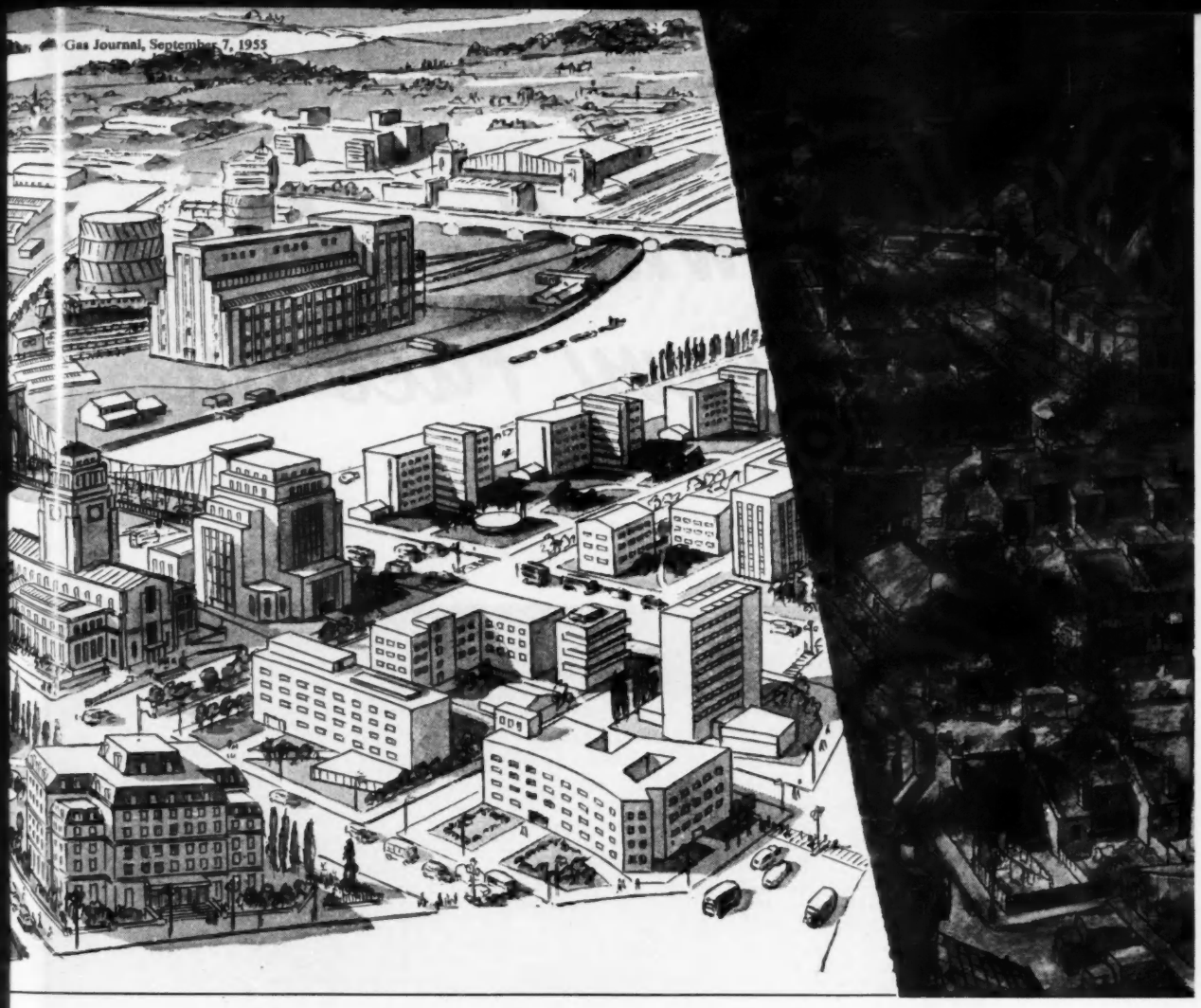


*Fig. 4. Scoop-control fluid coupling.*



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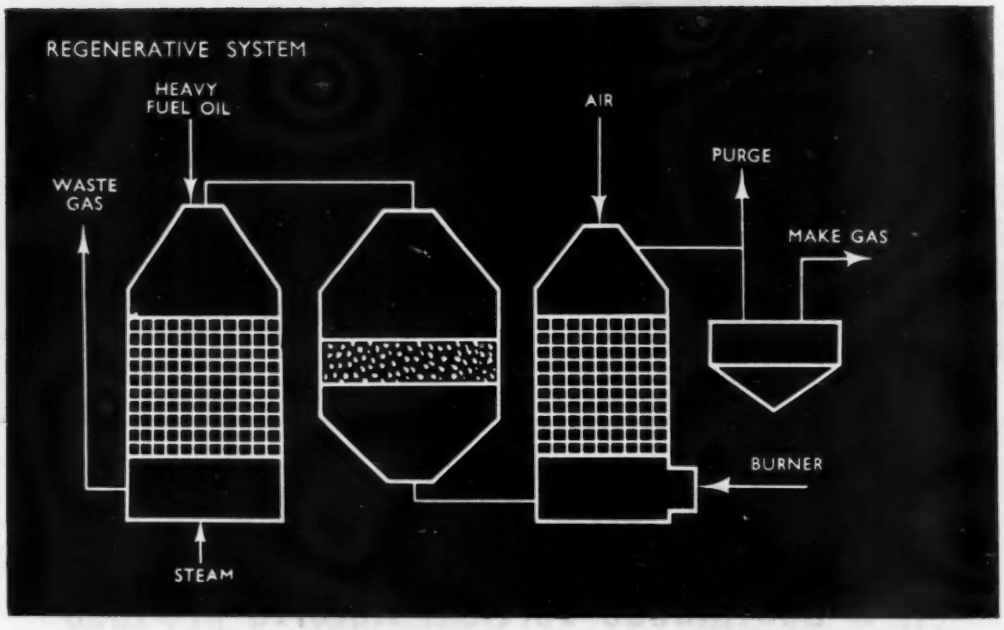


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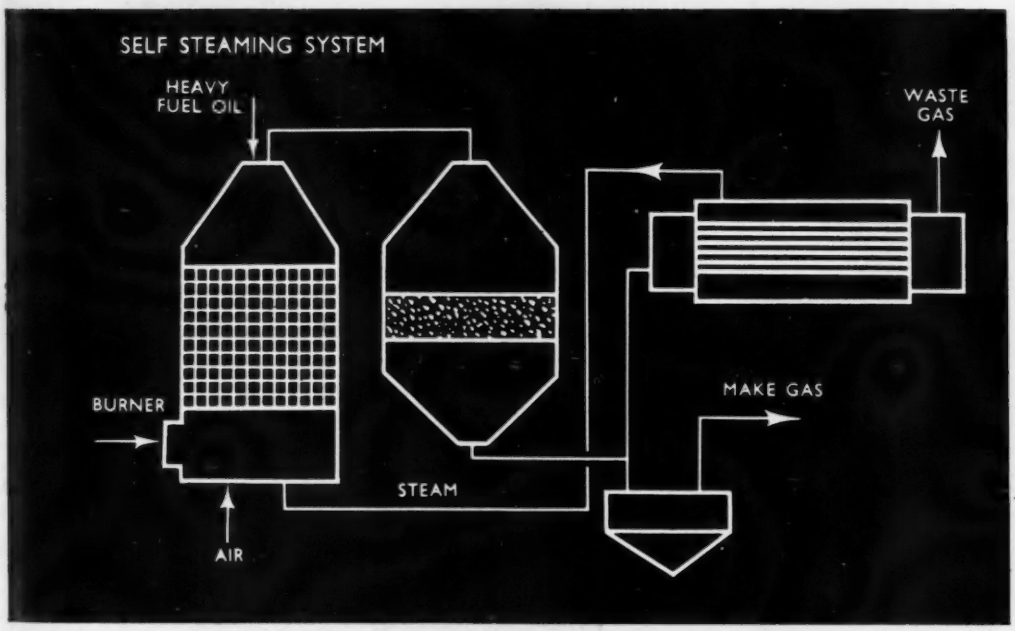


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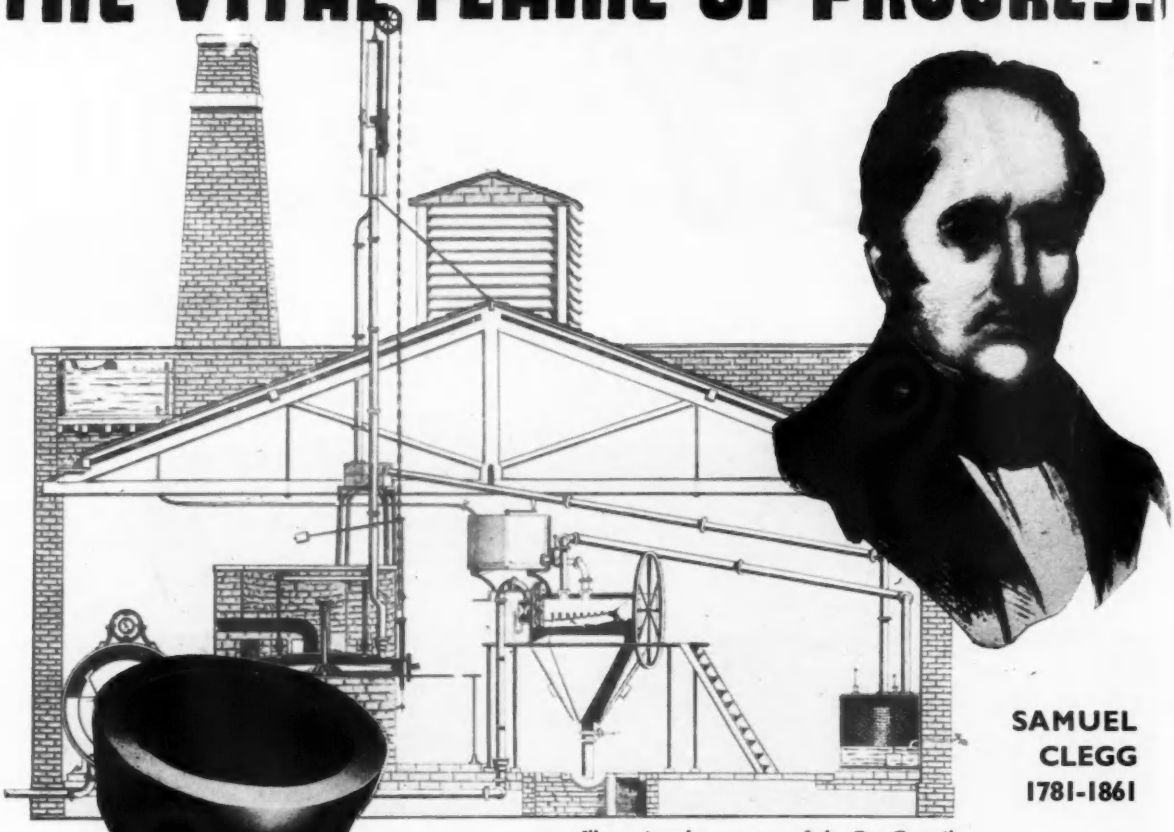

SAMUEL CLEGG 1781-1861

*Illustrations by courtesy of the Gas Council.*

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the speed (depending to some extent on the design of booster and on the resistance characteristics of the system into which it is delivering). A 20% reduction of speed will be accompanied by approximately 50% reduction of power consumption and a 50% reduction of speed, by 87.5% reduction of power. Under these conditions, the losses in the coupling at reduced speeds become insignificant as they represent such a small proportion (*i.e.*, a maximum of 16%) of the full load power.

*Other Basic Characteristics*

Apart from the fundamental characteristics of torque and speed conversion already outlined, there are several other features of fluid couplings which possess advantages in particular applications. These are summarized as follows:—

(1) Fluid couplings will not transmit shocks, snatches, or torsional vibrations from the driving to the driven machine or *vice versa.*

(2) Fluid couplings will not permit overloading of the machinery. In the event of the driven machinery being stalled the driving unit will keep running and the torque will be limited to a safe value. When the cause of stoppage has been cleared

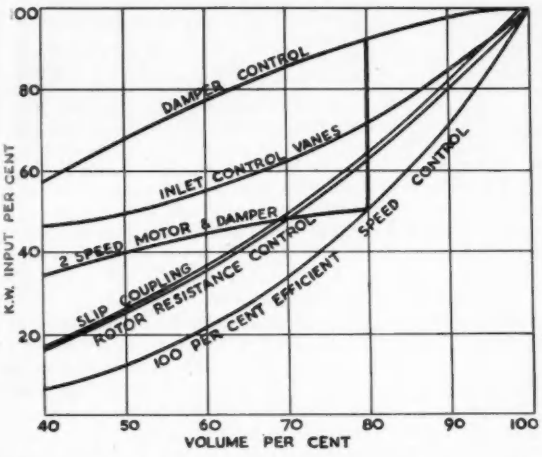


*Fig. 5. Comparison of methods of fan output control.*

the driven machine will immediately re-start. If there is any risk of the machinery being stalled for a long period it is usual with traction-type fluid couplings to provide a fusible plug in the coupling housing so that if the oil temperature exceeds a safe value the fusible plug will blow and release the oil, leaving the coupling to run free.

(3) The starting torque on the driving motor or engine can be reduced to very low values by either (a) providing a baffle between the impeller and runner (as shown in Fig. 1) to impede the oil flow at the root of the passages. This is most effective at low speeds, but as the speed rises the greater centrifugal forces tend to concentrate the oil circulation towards the outer perimeter of the passages and the baffle becomes ineffective. By this means a steeper torque speed curve can be obtained and the load on to the driving motor or engine while accelerating at low speed is reduced. (b) In the case of scoop control couplings to provide centrifugal ball valves in addition to leak-off nozzles in the outer perimeter of the impeller. At normal speeds of rotation the centrifugal force acting on the balls overcome the compression of the springs and they are pressed home against the seatings, thus restricting the discharge of oil to that which can pass through the fixed orifice leak-off nozzles. With this arrangement very little oil remains in the working circuit while the driving machine is accelerating, but when

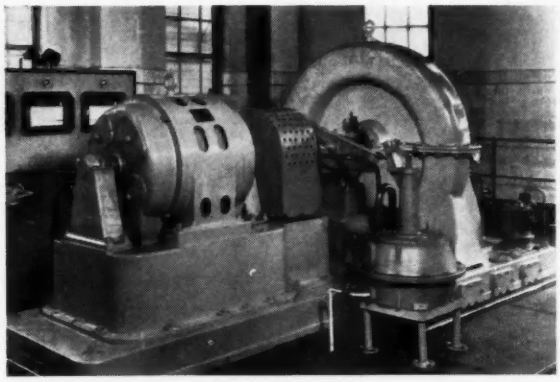

*Fig. 6. Electrically driven gas booster with scoop-type fluid coupling.*

it is approaching its full speed (around 90% of maximum) the centrifugal valves close and the quantity of oil in the working circuit builds up so that full torque is transmitted to the driven machine.

(4) If the driven machine tends to over-run the driving unit the fluid coupling acts as an effective brake and prevents damage being caused.

(5) If several prime movers or motors are used to drive any particular machine the incorporation of fluid couplings in each drive permits the loads to be shared equally between each of the engine units.

## Specific Applications

*Gas Boosters*

Gas boosters, exhausters, and pumps are divided broadly into two groups; those of the non-positive or centrifugal type and those of the positive displacement rotary or reciprocating type. For most pumping duties a fairly wide range of volumetric output is required and, although this can be achieved by throttling the gas flow in the case of centrifugal machines, or using by-pass control for positive machines, variable speed control is the most efficient method in all cases. The simplicity, cheapness, and high efficiency of electric motor drives coupled with the general improvement and reliability of electricity supplies on the works has led to an increasing use of this type of power unit for driving gas pumps.

Variable speed can be provided either by special commutator motors of the A.C. type or D.C. motors fed by grid controlled mercury arc rectifiers. Alternatively, the simple

*Fig. 7. Drives for cooling tower fans at the Beckton works of the North Thames Gas Board.* (*By courtesy of 'Coke and Gas'*)

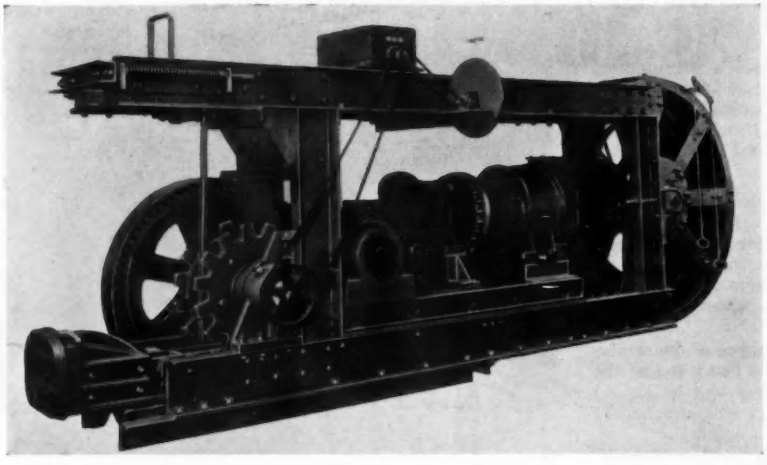

*Fig. 8. Retort discharging ram by Ride & Bell, Ltd., equipped with size 17·75 F.C.U., 25 h.p., 940 r.p.m. (Northern Gas Board).* (By courtesy of 'Coke and Gas')

squirrel cage motor arranged for direct-on starting can be used in conjunction with a scoop control fluid coupling.

The relative power requirements of alternative forms of drive for a centrifugal booster supplying a gas transmission system, in which the initial pressure varies as the square of the gas volume, are shown in Fig. 5. This indicates that the fluid coupling drive compares quite well with the alternatives. In addition, it has advantages of lower capital cost and greater simplicity, both of which features become of even greater advantage if the site conditions necessitate the use of flame-proof equipment.

Recent trends in gas engineering have been to make greater use of remote atuomatic controls, and in this connection the scoop control fluid coupling possesses advantages as it can be readily operated by an Ascania or Karlstedt regulator, frequently adopted for control purposes on gasworks. A number of booster and exhauster installations operating on this principle have been built and one example is illustrated in Fig. 6.

Fluid couplings as a means of obtaining speed variation are not generally so suitable for positive-type boosters and pumping plants, for in these machines the torque is directly proportional to the delivery pressure and is unaffected by changes of gas volume. This means that the internal losses within a coupling for a booster when running at reduced output are likely to be substantially higher with a positive machine than one of a centrifugal type.

For all pumping duties it is first essential to establish the overall characteristics of the booster in conjunction with those of the distribution system into which it is delivering. If it is found that the torque curve falls markedly more rapidly than the volume flow then there is usually a case for a scoop control fluid coupling. In addition, cases sometimes arise for small pumping plants where the simplicity of the fluid coupling alone justifies its use even though its efficiency may not be so good as alternative types of drive.

*Fans for Boiler Draught Control, Cooling Towers, etc.*

The characteristics of the the centrifugal type fan are similar to those of a turbo-booster and the same considerations apply when selecting scoop control fluid couplings to give infinite speed variation.

Many thousands of scoop control couplings have been applied to induced and force draught fans for steam raising boilers and in the majority of these cases the fluid couplings are operated automatically. They have also been used to advantage for speed control of forced draught cooling tower fans and a typical installation is shown in Fig. 7. Considerable power savings can be effected during the cooler seasons of the year when the rate of air circulation through the tower can be reduced.

*Materials and Mechanical Handling Plant*

By incorporating a traction-type fluid coupling in a belt conveyor drive, it is usually possible to rate the motor for the actual running load, knowing that the overload capacity will be available for starting purposes. In this way the motor accelerates under light load and its full or overload power which becomes available as it approaches full running speed can be utilized to accelerate the drive. Where the starting duty is heavy a standard squirrel cage motor and traction coupling may be used in place of the more expensive slip-ring motor with its control gear and resistances. The fluid coupling also protects the motor against overloading, while the smooth and steady accelerating torque applied to the drive results in saving in maintenance and in improved belt life. For the large powers outside the range of traction couplings, it is common to use the scoop control-type and in many cases the scoop lever is locked in the 'fully engaged' position so that starting is automatic as soon as the motor is switched on. The incorporation of centrifugal valves in this type of application permits the motor to accelerate under practically no load.

As fluid couplings are non-positive and it is possible for belt conveyors to be stalled by choking and overloading at the terminals, it is customary to provide the fluid couplings with fusible plugs to safeguard them against overheating if the drive is stalled for any appreciable time. It is also common to provide centrifugal switches on the conveyor terminals so that in the event of any particular conveyor in a sequence being stopped the whole conveyor sequence will shut down and excessive spillage thereby obviated.

*Link Conveyors and Bucket Elevators*

The safety features of the fluid coupling are of great value in such machines as elevators and chain conveyors which are more susceptible to damage caused by jamming. The fluid coupling protects the chain, gearing and the motors against overloads and permits of smooth acceleration.

*Horizontal Retort or Coke Oven Discharging Rams*

The drive to a coke discharging ram machine has always presented a design problem, and this has become worse with the trend towards the use of heavier coal charges and the resulting more difficult pushing conditions. For such applications the function of the traction type fluid coupling is to limit the maximum torque to a safe value and also to maintain a sustained pressure on the ram. This is possible because the motor runs at a high speed even when the fluid coupling output shaft is stalled. Under these conditions the motor may safely develop an overload for a short period as ventilation and cooling are good. The coupling also obviates shock loads on the machinery due to sudden stoppage of a ram, and experience has shown that maintenance costs have been materially reduced. A

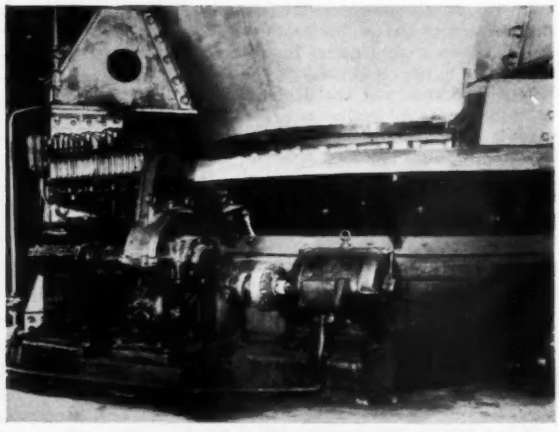

*Fig. 9. Carburetted water gas producer with mechanical grate drive incorporating traction-type fluid coupling.*

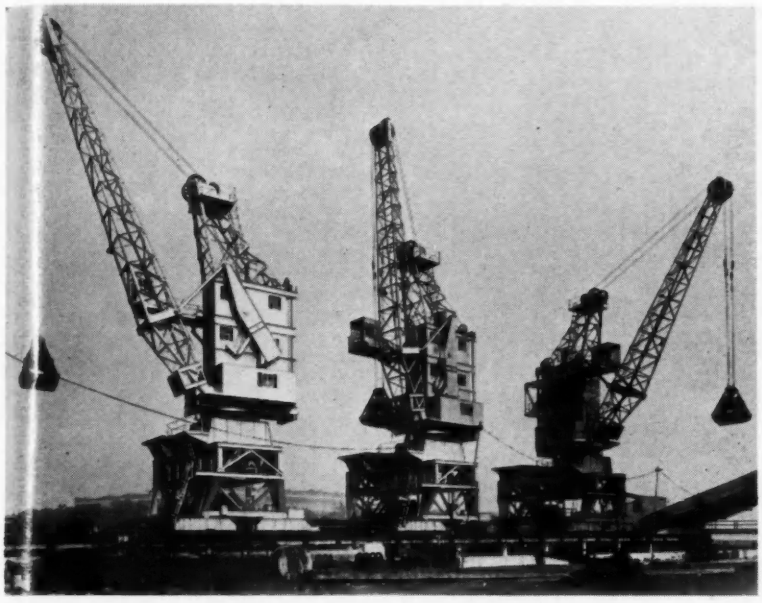

*Fig. 10. Three 9-ton level luffing grabbing cranes installed at the Thames-side wharf at Nine Elms gasworks.*

typical horizontal discharging ram fitted with a fluid coupling is shown in Fig. 8.

The retractable door extractor gear which is a feature of the coke oven ram machines is now frequently fitted with fluid couplings. These permit the doors to be withdrawn and replaced under continuous and steady pressure.

*Rope Haulages*

Where electric motors are used to drive rope haulages such as the quenching gear of an intermittent vertical retort installation, it is often difficult to avoid rope snatch when starting. The fluid coupling with a suitable degree of filling makes it possible to avoid snatch even when using a direct-on started squirrel-cage motor. Protection is also afforded in the event of a wagon becoming jammed.

*Rotating Grate Drives for Producers and Water Gas Generators*

Traction-type fluid couplings are now being used extensively in the mechanical grate drives of modern carburetted water gas and producer gas plants. These are drives where the fluid coupling can be used to protect the motor and gearing from overloads which might occur if clinker builds up on the grate. A typical illustration is shown in Fig. 9.

*Coal Crushers and Coke Cutters*

The flexibility of the fluid coupling when incorporated in the drive of coal crushers and coke cutters has advantages as it protects the driving machinery from shocks and damage in the event of the crusher becoming choked.

In some circumstancse a crusher may be stopped before clearing itself of the material and in this event it is more likely that the crusher can be re-started without damage if there is a fluid coupling in the drive.

As with other machines in which the starting load can be considerably higher than the running load, the ability to rate the motor on the latter condition instead of the former is a pronounced advantage made possible by the use of the fluid coupling. This is particularly important when all factors are taken into consideration, such as power factor, running efficiency, and cost of electric cables.

*Coal Grabbing Cranes*

The traction-type fluid coupling can be used to advantage in the slewing drive of large grabbing cranes for the following reasons:—

(a) The maximum torque transmitted by the fluid coupling is variable over quite a wide range simply by the adjustment of the oil filling, thus the correct degree of softness in the drive may be obtained by adjustment at site.

(b) The motor can be 'plugged' from full speed in one direction to full speed in the other and under more favourable conditions than with a direct drive. There is an entire absence of mechanical shock and minimum swing of the grab.

(c) Smooth inching is obtained which facilitates working in confined spaces.

(d) Electrical and mechanical maintenance is reduced to a minimum.

Fig. 10 shows three 9-ton level luffing grabbing cranes installed at the Thamesside Wharf at Nine Elms gasworks. Each crane is designed for an average working capacity of 250 tons per hour, but under favourable conditions 350 tons per hour can be achieved. In these cranes the master controller has three steps in each direction of slewing suitably graded to take advantage of the characteristics of the fluid coupling. The slewing gear is designed for 120 starts per hour.

*Diesel Locomotives*

The greater economy offered by diesel locomotives as compared with steam locos has led to their extensive use in industry. There are special advantages for diesel electric locomotives in the larger sizes, but for the more usual industrial locos the simplicity of the straight diesel mechanical locomotive has many advantages.

There are two technical problems connected with the diesel locomotive which have for a long time seemed worthy of solution. The first is the elimination of break or discontinuity in tractive effort and ensuing peak efforts at gear changes. The second is the utilization of greater horse-power from the diesel engine and so greater torque at low engine revolutions. A solution to these problems has been obtained by incorporating a Dual Fluidrive with SSS gear and a Paxman Hi-Dyne engine. The two couplings are connected to different gear ratios and by transferring the oil from one coupling to the other a continuous tractive effort can be maintained as the change is made from one gear to the other. The Hi-Dyne engine is a constant horse-power machine in which the torque falls with rising speed and by combining this characteristic with the gear change a speed/tractive effort curve approaching the ideal for rail traction can be obtained.

Other applications where the Dual Fluidrive system can be used to advantage include skip hoist drives, which require slowdowns at the top and bottom of the skip run, and various lifts and haulages.

## Conclusion

In this account of the basic principles of fluid couplings and their application to specific types of plant and machinery in the gas industry, an attempt has been made to indicate the most suitable type of application and the particular advantages which can be obtained by their use.

There are, of course, many other fields in which the fluid drive can be used to advantage, and with the continuing development and changes in gas engineering practice and technique the engineer should be aware of the principles and characteristics of fluid couplings so that, as new machines and plants are developed, opportunity should not be lost in using and applying fluid couplings in those cases where they provide real economic advantages.

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**A Meeting of the Vocabulary Committee** of the International Gas Union was held at Zurich on July 11 and 12, and was attended by representatives from Belgium, France, Germany, Great Britain, Holland, Italy and Switzerland. The Committee discussed and agreed the method of dealing with the first batch of 2,000 words and their explanation which have been prepared in French for translation by the respective national editors. A great deal of detailed work is involved, but the interest of a multilingual vocabulary is obvious at a time when international exchanges are becoming increasingly important.

# Fuel Services in New L.C.C. Schools

THE London County Council's vigorous school building programme is reaching fruition with the opening this month of several quite new schools and substantial extensions to others. We have inspected some of these, and they provide an interesting illustration of what facilities are considered necessary for education in 1955, and how L.C.C. architects provide them. The choice of fuel for heating, hot water supply, and cooking, is decided by the fuel panel at County Hall. Boiler plant is normally oil-fired, but choice of fuel for the kitchens appears to be somewhat capricious. Of the schools visited, two had electric kitchens and one had gas. (It will be recalled that the famous Kidbrooke School, which was described at length in the 'JOURNAL,' had an all-gas kitchen.) But there seems to be no sign of a definite policy, other than perhaps distributing favours fairly equally.

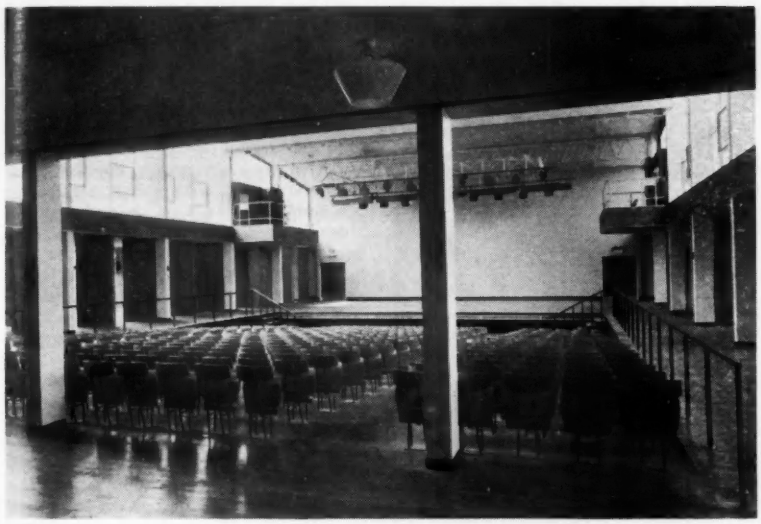
Kidbrooke School came to mind when we visited Catford County School, the new secondary school for 1,200 girls in Woodham Road, Lewisham. This is estimated to have cost £346,000, plus a calculated cost of furniture and equipment of £40,250. The teaching accommodation includes 23 normal classrooms, a library, two music rooms, a history room, two geography rooms, three gymnasia, four laboratories and preparation rooms, three arts and crafts rooms, four housecraft rooms, a commerce room, a model office, two housecraft flats, two needlecraft rooms, and a kiln room for firing pottery. The school is planned in two main blocks connected by a single storey link, where the administrative rooms are situated. One block, which is four storeys high, contains all the teaching accommodation and staff rooms. In the other block are the assembly hall, kitchen, changing rooms and gymnasia in single storey construction on two levels, with a mezzanine floor between. Heating is by low pressure hot water using oil-fired boilers

*A* GAS JOURNAL *photograph showing part of one of the four housecraft rooms at the Dick Sheppard School, Tulse Hill. The light and spacious conditions are clearly revealed, and these are partially explained by the photograph at the top of this page which shows the substantial area of glass used in the design of the school.*

with coils in corridors, forced convectors in the main assembly hall and hospital-type radiators elsewhere. Hot water is also from oil-fired boilers. Mechanical ventilation is by electric extract fans. Gas and electrical services and combined schools broadcast, class change, public address and fire alarm system with two-way communication points are provided throughout the building.

Distribution of services is by means of horizontal crawling ducts under the ground floor corridors feeding four large main vertical ducts. At the ground floor level, floor channels are used for the distribution of services. At intermediate floors and at roof level services are run horizontally in the thickness of the floor and roof construction. All electric conduit is clipped to the underside of the floor and roof beams and run in the 3 in. space between the bottom of the steel beams and the top of the ceiling panels, with junction boxes where required. All remaining services at floor level are run between the top and bottom booms of the steel beams and between the lacing bars which form the webs and which are all set out to standard centres to enable straight pipe runs to be maintained.

*The main entrance to Catford County School. Below is the assembly hall, the kitchen being at the far end opposite the stage. At the bottom of the page is shown a corner of one of the housecraft rooms.*



The main kitchen is electric, but gas comes into its own in the housecraft rooms and flats; the latter are furnished in contemporary style and are surprisingly lavish. Among the cookers installed we spotted three Radiation 84, three Vulcan G.996P4, two Cannon 125, two Main 'Century,' a De La Rue G.4, a Radiation 75, a Radiation 4183, and a Stoves X.2. Other gas appliances included two Main 32 'fridges, two 'Snowhite' F.27 drying cabinets, a Dean washing machine, a Parkinson washing machine, and an Ascot 503/2 sink heater. Gas was fed through a 3,000 cu.ft. per hour meter.

Rather similar in conception, but revealing differences in detailed design, is the Dick Sheppard School for 960 girls in Tulse Hill, Lambeth. This is estimated to have cost about £309,000, with the furniture and equipment accounting for a further £29,840. The new building, which adjoins Brockwell Park, includes an assembly hall to seat 500, a library, two gymnasia, three science laboratories and preparation rooms, a greenhouse for biology, two science lecture rooms, two arts and crafts rooms, four housecraft rooms, two housecraft flats, two needlework rooms, a general craft room, a commerce room and a model office; there are in addition 16 general classrooms, two study rooms, two geography and two history rooms and three rooms for musical studies.

Boiler plant with a total output of approximately 5,000,000 B.Th.U. per hr. is installed, of which 1,000,000 B.Th.U. is available for domestic hot water supplies. Boilers are cast iron sectional types fired by fully automatic oil burners. Heating and domestic hot water circulating pumps are in duplicate. The two heating boilers are controlled by indoor/outdoor regulators and the whole plant is

controlled by a time switch, with facilities for the extended running of the heating in kitchen, assembly hall and gymnasium blocks if required. A frost protection thermostat in a remote part of the heating circuit will override the time switch during 'off' periods should the water temperature fall to near freezing point and start the plant. Generally the classrooms are heated by means of convector heaters concealed in voids beneath the windows. Elsewhere radiators are used and heated pipe coils are incorporated in cloakroom fittings.

Domestic hot water is indirectly heated from the central boiler plant and is stored in two calorifiers, one 800 gal. situated in the boiler room and serving the kitchen, and changing room showers, and one 600 gal. situated in the classroom block and serving housecraft, and science laboratories.

The building has been planned in such a way as to achieve an open layout and falls into five main parts:—Four-storey teaching block; assembly hall and entrance; administrative block; two gymnasia with changing rooms; and kitchen and dining classrooms.

*The servery in Mayfield County School.*

*A view of the main kitchen at Mayfield County School.*

As the general level of the site is well below the main road alongside, the entrance is planned as a bridge leading from the footpath to the main entrance hall on the first floor; general circulation therefore between all blocks is at first-floor level. The first floor of the administrative block, which leads from the entrance to the classroom block, is also the main cloakroom. These blocks are linked by a two-storey bridge, a light structure on four columns with continuous glazing on each side set in aluminium glazing bars. The classroom block has four projecting wings and all classrooms are lit from two sides either direct or by borrowed light across a corridor.

Perhaps it is not surprising that the decor, which is for the most part, extremely contemporary but fresh and well conceived, has occasional eccentricities. One such is the decorative treatment on the north wall of the entrance hall, designed by Mr. Le Brocquy. This consists of an incised white pattern on a dark ground, derived, so we were told, from ancient Irish palaeolithic forms. Which only goes to show that doodling has its roots even farther back than we had supposed.

The kitchen-dining block is planned with the kitchen on the ground floor with a lift to the servery on the first floor communicating with those classrooms which are also used as dining rooms.

Here again, the main kitchen is electric, but gas is represented in the four housecraft rooms, the appliances being as follows: Four New World 84 cookers, three Flavel 68 cookers, three Main 'Century' cookers, two Dean 927 washing machines, two Snowhite S.27 and two F.48 drying cabinets, and four Electrolux 450 refrigerators.

Probably the most impressive of the all-gas large scale kitchens is at the extension to Mayfield County School, which will now house 1,600 girls. This is at West Hill, Putney. Gas equipment includes two 30 to 40 gal. d.p. Carron boilers, two 30-gal. Stott vegetable boilers, two 20-gal. Radiation vegetable boilers, a Smith & Wellstood two-pan fish fryer, four Main steamers, two Vulcan 83 double oven roasters, one Chester 2751 double oven range, four rinsing sinks, five 6-ft. Gardiner & Gulland hot cupboards, five Main 4-ft. hot cabinets. In the pre-catering room there is a Main boiling table, a Radiation 'Grosvenor' solid top range, and a Chester 217 range, a Savoy 27B boiler with stand, an Adastra 6-ft. hot plate with bain-marie, and a Stott No. 1 'Regula' café set.

## Safe Driving in Fife

Chief Constable J. R. Inch of Fife presented safe-driving diplomas to 11 drivers employed by the Fife Group of the Scottish Gas Board at a ceremony in Dunfermline, on August 29.

The drivers are the first in Fife to receive the diplomas since the Scottish Gas Board entered the safe-driving scheme under which awards are made by the Royal Society for the Prevention of Accidents. They are Dunfermline—W. Dryburgh, A. Hutchison, A. L. Jones, and J. W. Stoner; Buckhaven and Methil—R. English, D. Ewan, A. Fenton, and W. Withers; St. Andrews—T. Berry; and Anstruther—G. Allan and D. Wilson.

Presiding at the ceremony, Mr. D. L. Dickson, Fife Group manager, welcomed and congratulated the drivers on behalf of the Gas Board.

# Oil Gasification*

By W. J. WALTERS, B.Sc., A.M.Inst.Gas E.†

## Part I

THE gas industry visualizes an increase in demand for gas of some 20% in the next seven years, so that there are two forces driving it to look beyond coal for the satisfaction of its needs: a contraction of the supply of suitable coal coupled with increased demand for gas and, therefore, of gas-making fuels. The Gas Council budgets for a 6% increase in its demand for coal by 1960, and this would result in the anticipated increase of 5 to 6% in the quantities of coke and breeze available. There is, therefore, a clear recognition that, in the short run, the industry must so balance the concentration of its plant and resources that existing markets for both gas and solid products shall continue to be properly supplied.

In addition, it is planned to expand water gas plant capacity by about 30% with gas oil consumption increasing from 437,000 tons in 1953 to 577,000 tons in 1960. Further work into the total gasification of coal and the search for natural gas will also, of course, be continued, but these schemes do not bulk large in the industry's present calculations. It is against this background that a good deal of work has been carried out into the further uses of oil of various types, with a view to supplementing or replacing existing methods of gas manufacture and also of finding cheaper substitutes for the already expensive gas oil for carburetted water gas manufacture.

The supply of heavy fuel oils, the cheapest refined oils readily available in quantity at present, is by no means unlimited, however, and is not capable of the expansion that is often supposed. It is forecast that by 1960 oil refinery capacity will provide for an annual throughput of about 30 mill. tons of crude oil. Working on this figure it is calculated that, if the pattern of refining remains unchanged, some 12 mill. tons of fuel oil will be available each year as against the 1953 production of 10.747 mill. tons. To this must be added a further quantity of 0.969 mill. tons imported making a total of 11.716 mill. tons available. As against this, the consumption totalled 12.304 mill. tons, the balance being provided from stocks.

There is thus room for doubt as to the availability at economic prices of any large quantity of residual fuel oil since demand is increasing in other industries also. Even the C.E.A., despite its pronouncements in the report of 1953-54 concerning the unwisdom of installing oil-fired boilers without the equivalent standby coal fired generating capacity, has converted to oil burning at Bankside and Marchwood (Southampton)—though in both cases special considerations apply. Furthermore, the importation of large quantities of fuel oil have to be carried out in the face of increasing world, and particularly European, demand for fuel oil.

The availability of gas and diesel oils is even less promising; already some 1,350 tons are imported annually and in view of the ever increasing use of the diesel and jet engine, prices are likely to rise even further. It would also appear that the demand for fuel oil is likely to grow faster than the demand for motor spirit, particularly the lower grades. In November C. P. Dalton pointed out to the Institute of Petroleum that whereas in 1953 the demand for gasoline in the United Kingdom was 37%, and that for fuel oil 31%, of the total demand for petroleum products, it was estimated that by 1957 the proportions would be 32% and 36% respectively. It is therefore possible that, failing a suitable rate of increase in demand for the lighter fractions, the throughput of crude oil will be so limited that the demand for fuel oil could not be met and, in particular, the supplies on which the gas industry might be relying, would not be available. Despite the fact that sales of those vehicles using the lighter fractions show no sign of falling off, demand for them is not infinitely elastic.

It is therefore important that the industry should make flexibility the keynote of its oil-using policy. It must also work towards being able to use the lighter fractions of the oil-refining process, bearing in mind the storage difficulties from the safety point of view. In fact, the gas industry must, if it is to be assured of the fuel it needs at prices that it can afford to pay, be in a position to use whatever low-priced fractions the oil companies may have to offer. There are signs that this diversity is being sought and many of the processes are already able to produce town gas at economic prices.

### The Cracking of Hydrocarbons

The production of gas from hydrocarbon oils depends upon the splitting of the relatively large molecules of which these oils are constituted into smaller ones which are permanent gases. This is performed by the action of temperature alone or, more usually, by heating the oil in the presence of a carrier or further reactant such as blue water gas, steam or air. Some coalescence of the molecules to tar also takes place and carbon is usually deposited. This is known as thermal cracking. The presence of certain catalysts may bring about a considerable modification of these reactions and result in higher gaseous yields.

The constituents of the oils which give high gaseous yields are the open chain hydrocarbons or paraffins. Whether or not they are attached to other molecules they tend to break up when cracked into hydrocarbons of lower molecular weight. Other constituents—olefines, naphthenes and aromatic hydrocarbons—tend to form large molecules, yielding tars together with the evolution of a large proportion of hydrogen in the gaseous products. The presence of hydrogen or steam as a carrier may increase the gaseous yield by modifying the reactions of the hydrocarbons and reducing the formation of tar and carbon.

### Assessment of Oils for Gasmaking

Since a high gaseous yield is to be expected from oils containing a high proportion of paraffinic compounds it follows that such oils should be selected for gasmaking by thermal cracking. Some assessment of the value of an oil for this purpose can be made from a consideration of the chemical or physical properties. For distillates, the Griffith method, involving the chemical determination of the paraffin and unsaturated hydrocarbons, has for long been used. Work carried out by the North Thames Gas Board and still in progress indicates that the Viscosity Gravity Constant, (*V.G.C.*) where

$$V.G.C. = \frac{S \times 0.0887 - 0.776 \log.\log.(10\,V - 4)}{1.082 - 0.72 \log.\log.(10V - 4)}$$

$S$ = Specific gravity of the oil at 60°F.
$V$ = Kinematic viscosity of the oil at 60°F.

might be used as a means of determining the percentage of open chain hydrocarbons in oils and hence, by correlation with plant data, of assessing the thermal yield to be expected from a given oil.

It is expected that this method can be applied to the evaluation of residual oils as well as distillates and, owing to the relative ease with which the gravity and viscosity can be determined, it would be very useful for routine evaluation. The carbon/hydrogen ratio is also regarded as an index to the thermal yields to be expected from the thermal cracking of hydrocarbon oils, and several formulæ have been evolved correlating these two quantities. The following formulæ have been deduced by the Anglo-Iranian Oil Company, the first being applicable to distillates only and the second to distillates and residual oils:—

$$\text{Therms per gal.} = 2.933 - 0.249\ C/H$$

and

Gas enrichment value $M$.B.Th.U. per lb. $= 30.05 - 2.462\ C/H$.

Where $C/H$ is the carbon-hydrogen ratio.

There is insufficient evidence as to the suitability of these methods for evaluating oils for catalytic gasification. Small

* From a paper read to the London and Southern Junior Gas Association earlier this year.

† North Thames Gas Board.

scale cracking units in the laboratory are also used, particularly in the United States where they are frequently used for routine process control.

## Types of Oil for Gasmaking

The refining of crude oil results in the production of a whole range of distillates from heavy lubricating oils to petrols. Among these distillates are the gas oil fractions which, by virtue of their high paraffin content, relatively high flash point and low viscosity, have been used extensively by the gas industry for the manufacture of carburetted water gas. Residual fuel oil consists of whatever residues are left in the stills after the other products have been distilled off, together with residues from other refinery processes. This is usually of some 3,500 secs. (Redwood No. 1) viscosity and is thinned down to produce fuel oils of varying viscosities by the addition of some other oil of low viscosity. In the United Kingdom this is usually cycle oil, a product of catalytic cracking in the refinery.

One of the main characteristics of fuel oils, which vary a great deal in composition according to the source of the oil and method of refining, is that they contain a high proportion of high boiling point hydrocarbons which decompose on heating, leaving carbonaceous residues. It is these residues particularly that call for special technique and plant when using heavy oils for gas manufacture.

## Oil Gasification Processes

Any process which is to be used to produce town gas and which is supplementary to existing coal gas plant must be able to produce a gas having combustion characteristics very similar to those of the existing supply or the proportion admixed must be restricted so that the effect is slight. Carburetted water gas, the most common addition to coal gas, has a fairly high specific gravity and a high burning velocity but can be admixed with coal gas in all proportions. The Jones process and the more recent catalytic oil cracking processes produce gas having combustion characteristics not very dissimilar to those of normal town gas.

Up to to the present time in Britain most oil gas processes have been used, principally, to meet seasonal and peak loads only and the proportion of these gases in the gas distributed has not been high. With the increasing interest in their use for base load purposes the combustion characteristics are becoming more important. An important factor of these processes is their low capital cost as compared with coal carbonizing plant. The scope of any capital investment programme aimed at increasing gas output might well be increased by including suitable plant of this type.

The most common use of oil in the gas industry in this country is for the enrichment of blue water gas by the thermal cracking of gas oil. There has been little general interest in the production of base load gas from oil until very recently when cheaper grades of oil became available. Now, however, suitable processes are being developed. Processes producing gas principally from heavy oils have been in use in the United States for many years, but as most of them were designed to produce gas of high calorific value they are of limited application in Europe.

According to the method of cracking of the oil employed, processes can be classified as follows:—

*Thermal Cracking Processes*

| | |
|---|---|
| (1) Carburetted water gas .. .. | Thermal cracking in the presence of hydrogen. |
| (2) Hall process, etc. .. .. .. | 'High B.Th.U. processes' involving thermal cracking in the presence of steam. |
| (3) Jones process and other Pacific Coast processes | Thermal cracking at high temperature in the presence of steam or hydrogen and with the formation of carbon black. |
| (4) G.L.C.C. process .. .. | |
| Dayton process .. .. .. | Partial combustion of oil in air. |
| G.E.I.M. process .. .. .. | |

*Catalytic Gasification*

| | |
|---|---|
| (1) Segas process .. .. .. | Gasification in presence of steam and a lime magnesite catalyst. |
| (2) O.N.I.A.-G.E.G.I. process .. | Gasification in presence of steam and a nickel-based catalyst. |

## Carburetted Water Gas

The enrichment of blue water gas by the evaporation and thermal cracking of oil sprayed onto hot checker brickwork during the 'make' period has been standard practice in the gas industry for many years. The oil is evaporated in the carburetter by impingement on hot checker brickwork, or directed into the gas by atomization in a checkerless carburetter. In either case the cracking is completed by passage through a checkered superheater. The use of gas oil and other distillates presents little difficulty but the use of oils having high carbon residues involves the problem of the deposition of these residues within the vessels. As a result of a considerable amount of experience in the use of heavy oils almost entirely in the United States, a large number of techniques have been evolved which have partially solved these difficulties. The principal methods employed are: (1) Injection of the oil into the generator; (2) the use of checkerless carburetters; (3) the use of preheated air for the cyclic combustion of the carbon deposits. These methods can be employed separately or may be combined.

*Injection into Generator*

If, during the 'uprun,' heavy oil is sprayed over the surface of the fuel bed the residues are left and gasified in the generator while the volatile portion of the oil is carried forward with the make gases and cracked in the carburetter and superheater. Further quantities of either distillate or heavy oil may be added in the carburetter as required.

The evaporation of the oil from the fuel bed is improved by heating the surface with what has come to be known as 'marginal air.' This air is introduced during the 'blow' at several points round the periphery of the generator slightly above, but directed downwards towards the surface of the fuel bed, and raises it to incandescence. The quantity of oil that can be added to the generator is considerably increased by this method but, depending on the volatility of the oil there is generally insufficient heat capacity available to evaporate completely more than about 70% of the total oil required to produce a gas of from 450 to 500 B.Th.U. per cu.ft. Incomplete evaporation during the 'up run' results in a proportion of the oil vapour being carried down through the fuel bed and 'reformed' (*i.e.*, overcracked, mainly to hydrogen). If this happens there is considerable loss of enrichment from the oil, but an increased volumetric output from the plant. If oil residues are cheap in relation to coke, as is the case in America, then it is economic to use as much oil as possible in the process. The addition of a proportion of the oil to the generator during the 'back run' is practised and also part of the blow gases rich in carbon monoxide is included with the gas made, ('blow-run').

*Checkerless Carburetters*

Downward flow checkerless carburetters for the use of heavy fuel oil have been in operation for many years in the United States. They have also been used as standard equipment for carburetting with gas oil in some types of installations in this country. With this type of carburetter, oil is atomized by means of a spray usually located either at the base or in the side of the carburetter, so that the direction of the injection is upward and counter-current to the flow of the gas, the sensible heat of which causes the droplets of oil to evaporate. Difficulty is experienced in obtaining an even distribution of oil across the carburetter and some oil does impinge on the side of the vessel.

When using heavy oil the residues are deposited on the sides and bottom of the vessel, and while some are burnt off during the 'blow' this process is far from complete and the deposits accumulate. These deposits are removed periodically, the frequency of removal and the time required varying considerably with the type and quantity of oil used. The time taken may be three to eight hours every second day when using oil of 10% Conradson carbon or every fifth day if the residue is 8%. The time required usually increases disproportionately with the carbon residue of the oil.

A recently improved form of checkerless carburetter has, it is claimed, considerably reduced the cleaning necessary. This is the Semet Solvay reversed flow carburetter, which is shown in Fig. 1. In this the oil is atomized at the top of the vessel and falls against the upward flow of the hot uprun gases. The provision of a throat at the bottom of the vessel gives the inlet gases an increased velocity which tends to maintain the oil droplets in suspension until evaporation is complete. The non-volatile residues are lightly deposited within the vessel in such a way that, it is claimed, they are readily gasified during the 'back run' and the 'blow.'

*Cyclic Combustion of Deposits*

In order to obviate the need for the periodic removal of deposits from the vessels, several methods of burning them off

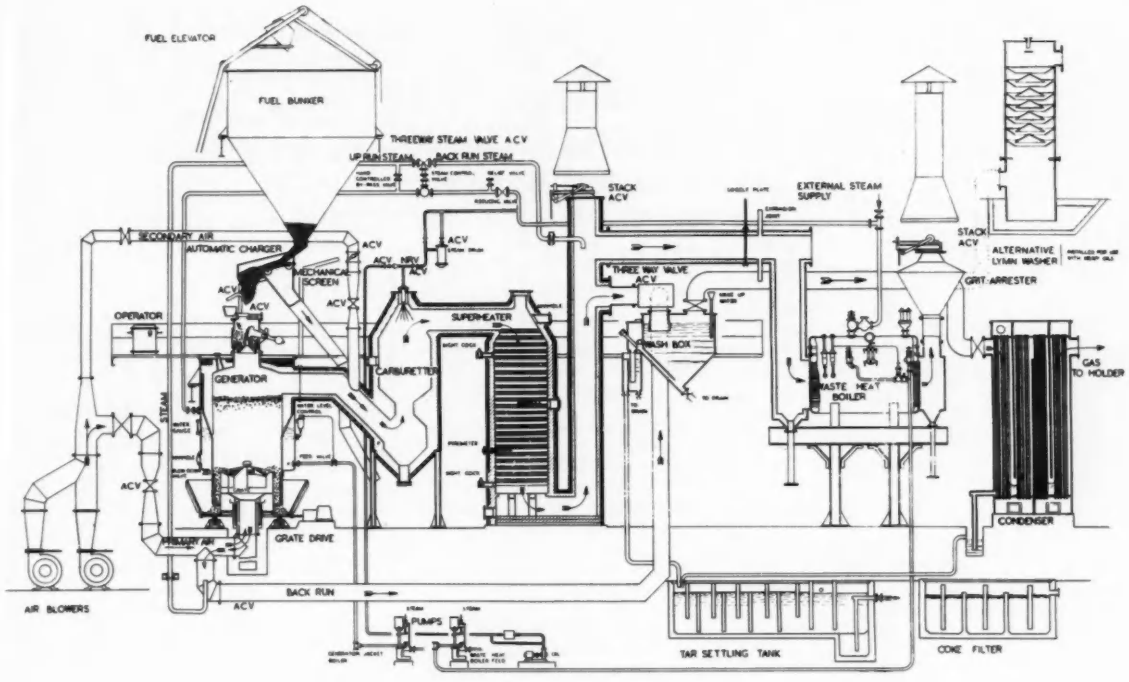



*Fig. 1. Power-Gas carburetted water gas plant incorporating the Semet Solvay reverse-flow carburetting system.*

cyclically have been devised. Of the methods used in the United States, the 'reversed-air-blast' process has been successful. In this process a proportion of the air for the blow is introduced at the top of the superheater, and during its passage through this vessel it is preheated so that the carbon deposits in the carburetter are readily burnt off. The air is then passed downward through the fuel bed and the gases rich in carbon monoxide are included with the make gas. This aspect of the process—which cannot be avoided without complications to the plant, with its effect on the specific gravity of the gas made—renders it unsuitable for most requirements in this country.

The gasification of heavy fuel oils is usually accompanied by the formation of tar-water emulsions which are difficult to separate and which contain up to 80% of water. These emulsions separate very slowly, if at all, when subjected to the heat treatment normally accorded to the dehydration of tars produced when gasifying gas oils, and special techniques have been evolved such as autoclaving, flash distillation and centrifuging. These methods are usually costly and do not always produce satisfactory results.

Interest is at present centred around two techniques, namely hot gas detarring and the use of surface active agents. The purpose behind hot gas detarring is to deposit the heavy tar fractions which may contain emulsifying agents (free carbon and asphaltenes have been suggested) by means of an electrostatic detarrer at such a temperature that the condensation of water is avoided and anhydrous tar only deposited. The remaining tar fractions and water can then be condensed out and would be expected to separate without difficulty.

The installation of an electrostatic detarrer at such a position in the stream—*i.e.*, at the outlet from the plant, means that it must be capable of dealing with a very high rate of gas flow for, not only is the gas volume increased by its temperature and water vapour content, but it must be handled at the instantaneous rate of production.

The addition of surface active agents such as Amine 220 or Bitron T.C. to the washbox circulating water, which also mixes with condensate from other parts of the system, has been found to give very good separation of tar and water, and there is no difficulty in producing tar having a water content of less than 5%. These substances are expensive, however, and wastage may be high on plants where a large amount of undecomposed steam is condensed and a large proportion of the circulating water subsequently run to waste.

### Thermal Cracking in Presence of Steam

Owing to the extensive use of natural gas in the United States many processes have been devised for the production of gas having a similar calorific value as natural gas by the direct cracking of heavy fuel oils. These processes are needed either to supplement natural gas supplies or to produce gas in areas where it is not available. On the Pacific Coast where coal and coke have for long been expensive and natural gas is not available, a series of processes utilizing very heavy grades of fuel oil and producing a gas having a calorific value of some 570 B.Th.U. has been developed.

Most of these processes, which are cyclic, depend upon the thermal cracking of oil on hot checker brickwork in the presence of steam. Carbon deposited is burnt off by preheated air and the temperature of the plant is maintained by the combustion of this carbon and that of the oil added as required. It is in the measures taken to burn off this deposited carbon that the processes differ most. Most of them have been designed so as to utilize unwanted carburetted water gas plant shells.

*The Jones New Oil Gas Process*

As mentioned above, processes have been developed on the Pacific Coast of the United States producing gases of a calorific value of 570 B.Th.U. per cu.ft. In general these processes use very low grade oils which are cracked at relatively high temperatures and form quantities of lampblack in addition to the gas. The gas has a high hydrogen content and low specific gravity.

The Jones new oil gas process recovers most of the lampblack from the gas and uses this to produce heat during the heating-up part of the cycle together with some blue water gas during the gasmaking period so that the cracking of the oil takes place in an atmosphere of hydrogen and steam.

Each shell of the generator contains two sections of checker brick and has a gas offtake between the sections leading to a filter producer and thence to a washbox. There is also provision for the introduction of secondary air at the top of each shell and oil into the make chamber between the two checker brickwork sections. Each filter producer has a rotary grate upon which rests a layer of refractory spheres, and during

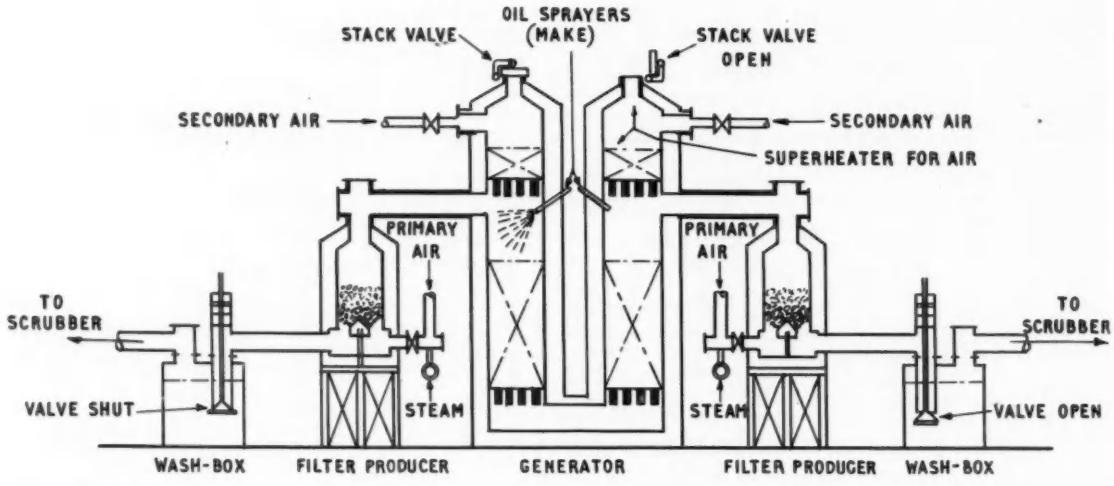



*Fig. 2. The Jones new oil gas process shown diagrammatically. The process uses very low grade oils producing large quantities of lampblack, in addition to the gas. Most of the lampblack is recovered.*

the operation, a fuel bed of lampblack gradually builds up and serves as a filter to recover the lampblack suspended in the gas. The steam and primary air inlets are connected to the bottom.

The cycle consists of four parts, a 'blow' and a 'make' period in each direction. Working from left to right of the diagram (Fig. 2), and starting with the 'blow' period, primary air, with or without the addition of steam, is introduced at the bottom of the producer and the producer gas formed is burnt in the 'make' chamber of the left hand generator by secondary air preheated in the top section of checker brickwork. The hot products of combustion pass up the right hand generator and out of the stack. The make chamber is thus heated, and carbon deposited during the previous make period is burnt off. This is then followed by a 'make' period in the same direction, for which purpose steam is introduced into the bottom of the left hand producer. The blue water gas formed, together with the superheated undecomposed steam, pass into the make chamber where the oil is sprayed on to the checker brickwork. The oil vapours are cracked in the presence of the blue water gas and steam during their passage down the left hand and up the right hand generators to the filter producer where the suspended lampblack is removed and the gas enters the washer. This procedure is then repeated in the opposite direction. Plants of this type have been operated in the United Kingdom, but have been modified so as to produce lampblack which had a good market value.

*The Hall Process*

One of the more recent and successful processes developed for gasifying oils having a high carbon content and typical of the processes under discussion is the Hall process. Plant for this process can be constructed by coupling up four shells of adjacent carburetted water gas sets. A wide range of oils can be efficiently gasified by this process without difficulty, including those of high Conradson carbon content. The amount of oil of high Conradson carbon that can be gasified per cycle is less than with other oils, and the output is correspondingly reduced.

Typical results using oils of varying carbon content are as shown in Table I.

TABLE I

| | | | |
|---|---|---|---|
| Conradson carbon content of oil .. .. | 0.2 | 6.02 | 13.03 |
| C.V. of gas B.Th.U per cu. ft. .. .. | 1046 | 1047 | 966 |
| S.G. of gas .. .. .. .. .. | 0.855 | 0.834 | 0.867 |
| Gas made per day, thous. cu. ft. .. .. | 5952 | 5088 | 3576 |
| Per 1000 cu. ft. of 1000 B.Th.U. gas:— | | | |
| Heat oil gal. .. .. .. .. | 0.83 | 0.80 | 0.23 |
| Make oil gal. .. .. .. .. | 9.60 | 8.90 | 9.75 |
| Total oil gal. .. .. .. .. | 10.43 | 9.70 | 9.98 |
| Therms per gal. .. .. .. .. | 0.96 | 1.03 | 1.00 |
| Tar yield % total oil .. .. .. | 20.5 | 19.8 | 22.0 |
| Thermal efficiency (gas and tar) % .. | 79.2 | 81.8 | 80.6 |

The Hall process, in addition to its use as a supplementary process to natural gas supplies, is of value under circumstances where a suitable diluent is available before distribution on to a district employing a lower calorific value. Thus, an installation at the Gennevilliers works of Gaz de France, where producer gas is used during peak loads, has been successfully operated and has given results similar to those given in Table I.

## Gasification by Partial Combustion of Oil

Most hydrocarbons when mixed with quantities of air insufficient for complete combustion can, under certain conditions of temperature and pressure, propagate flames which are quite different from normal flames. Thus, within certain ranges, 'cool' flames are propagated having temperatures of the order of 390°C. or less and giving rise to the formation of water, carbon monoxide and such compounds as aldehydes and peroxides in addition to the unchanged hydrocarbon. An increase in the temperature and/or pressure may give rise to a second type of flame which follows in the wake of the 'cool' flame and, depending on the conditions will almost coalesce with the 'cool' flame. This flame, which is formed by the decomposition of the products of the 'cool' flame, is known as the 'cracking' flame, and if coalescence is complete, the chief products are carbon monoxide, water, methane, ethane, ethylene and other olefines. Some benzene is also formed by the removal of side chains from aromatic nuclei and also carbon dioxide and hydrogen. The calorific value of the gas obtained depends upon the air/oil ratio and also upon the degree of preheat. The greater the degree of preheat, the less the air necessary to ensure efficient cracking and the higher the possible calorific value.

Processes based on the above principles have been operated, notably the 'Improved Drayton' and the G.E.I.M. process. A process developed by the Gas Light and Coke Company and installed at the Southall and Southend works respectively, includes improvements on the others mentioned. Processes of this type can gasify distillate oils only.

Typical results obtained on the Southall plant, which is of some 3 mill. cu.ft. per day capacity, are as follows:—

| | | |
|---|---|---|
| Therms per gal. of oil .. .. | = | 1.15 |
| Calorific value of gas .. .. | = | 514 B.Th.U. per cu. ft. |
| Tar produced (total) .. .. | = | 22% of oil |
| Tar used to preheat oil and raise generator heats .. .. | = | 5.6% of oil |

The hydrogen sulphide content of the gas is very low and purification and cooling requirements are slight. These considerations together with the low capital cost of the plant itself and the fact that it can be quickly picked up from cold make it particularly suitable for meeting peak loads. The high nitrogen content and consequently high specific gravity make it necessary to limit the proportions in which it is admixed with coal gas for distribution.

*(To be continued)*

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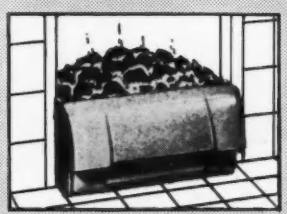
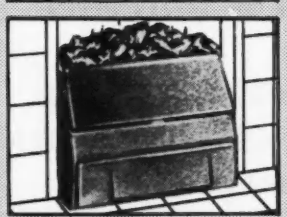


Standard



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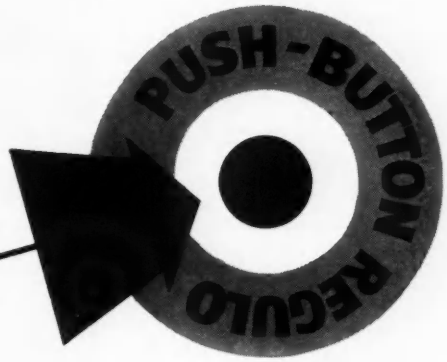


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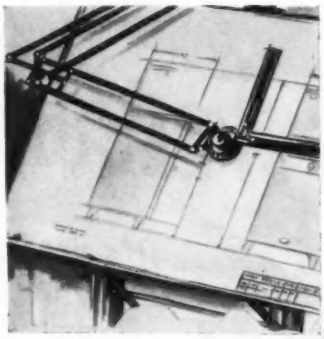

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# Market Research*

By A. H. Davies, B.Sc.(Econ.), M.I.P.A., M.S.M.A.†

THERE are several different approaches open to anyone about to talk on market research. The speaker can assume that his listeners know little and care less about the subject, and launch himself into a very general appreciation of its place among the more enlightened techniques of commercial management. He can also attempt an appraisal of the contribution which this service renders to business. This is the approach which is usually favoured by speakers at the large management and advertising conferences. At the opposite end of the scale is the approach which assumes that the speaker's listeners may not know much about market research, but, nonetheless, should have a detailed knowledge of even the more esoteric techniques. This speaker can easily fall into the trap of blinding his listeners with science, and is more at home in the longer lecture courses preparing for professional examinations. It is hoped on the present occasion to set a middle course between these two and to project some of the problems, thoughts and actions which centre around a research executive's desk during his everyday research work.

## Definition of Market Research

First of all, however, it might not be inappropriate to draw a general analogy which will serve to illustrate what is really meant by the phrase 'Market Research.' Broadly speaking, market research is the commercial equivalent of military intelligence. It employs a very similar network of 'seekers after the truth' and much the same processes of appreciation. Just as a wise military commander would not consider mounting an attack on any sizeable military objective without considerable intelligence investigation beforehand of the enemy's strength and reserves, so no commercial enterprise should consider a similar all-out assault upon sales territory held by its competitors, without considerable investigation into the size and nature of the opposition which it is likely to encounter, not only from the competitors, but also in sales resistance from the customers it intends to woo. Therefore, just as an estimate of war-power is needed by the military commander, so are estimates of commercial power required by manufacturers.

The techniques and processes of obtaining information implicit in the researcher's training can be applied to all four spheres of activity associated with any business, whether it be manufacturing a product, operating a utility or distributing the results of either. Research can give considerable assistance to top management in their policy decisions with regard to such vital factors as finance, raw materials and labour—the economist's 'factors of production.' Much useful data which will help in the solution of problems of accommodation, taxation and maintaining those cordial relations between management and staff, which are the key to the successful operation of any business—all these come into the research executive's hands.

Research can aid considerably in either arriving at the most saleable form of product or service, or alternatively in maintaining that product or service in its most saleable form over a period of time, by producing sound facts upon which to take decisions as to price, style and quality. Unfortunately for all of us, there is usually a difference between the consumer's opinion as to what he would like and what he actually purchases, but nevertheless considerable information concerning all aspects of the market to which the product or service is directed can be obtained by painstaking research. This is particularly true of the distribution of the market in terms of population, buying power and other important characteristics.

Lastly, the fact that a product or service is available to a market that wishes to obtain it, is not necessarily synonomous with established sales to that market, and research techniques can provide yardsticks by which the efficiency of selling, sales promotion, advertising and other methods of bringing product and consumer together in a satisfactory sale, can be measured. In a sentence—research is a blank key which can be cut to open many locked doors.

At first thought, it may be assumed that research techniques are only in their infancy in application in this country, but for many years now all our larger, and many of our smaller, manufacturers and traders have employed skilled market researchers and economists to assist them, not only in the production of satisfactory products and services, but also to help them predict the demand for future products and services, to enable them to maintain full economies of large-scale production.

One of the major assets of research is that it can help to measure the effectiveness of promotion, and some of the most skilled and extensive users of research techniques in this country are to be found in the larger and middle-sized advertising agencies, many of which, in fact, conduct full-scale research on behalf of their manufacturing or trading clients. The Government, too, must be thanked for giving considerable stimulus to the development of efficient techniques through its Social Survey Unit which, during the war, was responsible for such efficiency controls as the utility scheme for clothing and the rationing of essential foodstuffs, as well as providing the Government with factual information on the 'State of the Nation.' Alongside these large practitioners in research has grown up a small but highly skilled group of companies specializing in particular types of research—for example, the A. C. Nielsen Company in retail stock movement, the Gallup Poll in public opinion and Attwood Statistics in household consumption.

From this brief synopsis, therefore, it is hoped that the impression has been given that research of this type is by no means either small-scale or haphazard. Indeed, all the research work dealt with by the average research executive follows a well-tried logical sequence of thought and practice, in which the four main stages of *Preparation:* the sorting out of the problem, the gathering of already available information—and based on this work the detailed planning of a survey: the *execution* of the survey and the testing and checking of the information, all being carried out along clearly defined, but by no means rigid, channels. The *summation* of the information—its collation into statistical tables; the interpreting of these results and their presentation to the sponsors—is governed by the established practices of statistics. Indeed, until the final stage of the survey, its *application* to policy, the work is never of other than the highest professional standards.

## Preparation of a Survey

In considering the preparation of a survey, the research executive must spend much time in detailed consideration, not only of ends, but also of ways and means. The four prime questions of why, what, where and how all being conditioned considerably by the circumstances, the objectives and the product or service with which the survey is concerned. Not only must the researcher consider the facts which are required to be found by the survey, but also the use to which those facts will be put and the persons (and their intellectual and educational standards) by whom they will be used. The nature of the facts themselves will, in their turn, be dependent upon the exact nature of the enquiry—whether it is concerned with the product or service itself, the market for it, the means by which it should be promoted to that market, or, in what is still a minority of cases, the policy which will be adopted in producing the product or service.

The researcher must never allow himself to be blinded to the fact that he may not be the only person interested in the problem which concerns him. It is more than likely that at least certain aspects of it will have been investigated by other

* From a paper presented to the Eastern Gas Board Staff Conference in May.

† Marketing and Research Manager, Rumble, Crowther & Nicholas Ltd., Incorporated Practitioners in Advertising.

persons already and that this information may be available to him from a wide variety of sources. It is not until he has investigated all these possible sources of information upon which a solution to the problem might be based, that he faces the considerably more expensive and arduous task of finding those answers for himself. The methods by which he finds the answers will again be dictated both by his experience as to the practicability of particular methods of enquiry and also by the form in which it is most desirable that the results should be available, in terms of the uses to which they are to be put. He must also consider, in this latter connection, the possibility that he may be required to provide information not only on this particular occasion, but comparatively, on a number of occasions in the future. If the latter requirement is to be met, great care and precision will be required to ensure the complete dependability of the different sets of information.

The most prolific collector and supplier of information in this country on all aspects of industry and commerce is, of course, the Government. Not only are considerable quantities of factual information available in the usual Government publications, but also a persistent seeker can usually obtain much more detailed information (even if at the cost of a few guineas service fee) from the appropriate department. Second in importance to the Government come other companies engaged in the same or similar business, particularly where these are banded together with the researcher's own organization into a trade association. The universities do much original work which, for reasons of time and finance, is not always possible in the commercial world and, on the broader principles of policy, the national press can often afford investigation work, which, while not necessarily of the highest calibre statistically, can often provide considerable background material upon which to base future research. The last two important groups are the appropriate trade press and consultants or other persons in the business or industry, who should never be entirely forgotten. It is particularly true that valuable information can usually be obtained from the trade press, especially in the more technical fields such as chemical engineering, electronics and so on. One should never forget that there is already available the accumulated experiences and qualified opinions of other members of one's own staff.

Let it be assumed that the researcher has solved the problems associated with the preparation of the survey, has consulted his sources and can pass on to the detailed planning of his research to find original factual information. Up to this point, much of the work could quite easily have been undertaken by any intelligent executive, with little research training and experience, provided he has a logical sense of order. The detailed planning of field surveys, however, can only be undertaken satisfactorily by a technically trained research executive of some years experience. The problems associated with such matters as the questions to be asked or the record forms to be used—the training and control of skilled and, therefore, to some extent temperamental, staff—can only be learned the hard way. Qualified statistical mathematicians *can* produce a statistical sampling plan upon which a survey is to be based, but only the practising researcher can put it satisfactorily into operation.

### Qualifications of a Good Researcher

It is at this stage that one of the most important intellectual qualifications of the good researcher becomes most apparent. Even though he himself has carried out all the planning stages for the survey and should, therefore, normally be assumed to believe these to be the best possible, he will never leave anything to chance, but will carry out a considerable number of tests to ensure that he himself has done his work properly.

One of the major headaches facing a research executive is that of cost. He himself may lay down the ideal conditions under which to obtain a particular set of data and the amount which it would cost to obtain the information, but he may well be told that it is not worth it. The research executive, however, knowing that the information *is* required, spends much of his time balancing possibilities in survey technique against the probabilities of cost. This is particularly difficult in view of the fact that he cannot always tell the sponsor exactly what information may be obtained, and, therefore, whether the latter will get value for his money, nor can he always estimate accurately in advance how much any particular project will finally cost.

After these complications, the actual carrying out of the survey would seem simple. Purely a matter, in fact, of asking the right people the right questions in the right way and recording the answers as they are given. In practice, of course, this is a gross over-simplification and not only must the researcher ensure that his staff know exactly what is required of them, but he must maintain a continuous watch for biases which may affect the validity of the results. These biases arise from many different facets of the execution of the survey, ranging from badly worded questions, through wrongly chosen and unrepresentative informants, to unreliable staff. Even when the collection is complete, he must not ignore the fact that as he may want to go the same way again, he must leave no bad impressions behind him.

### Summation of Facts

After all the facts have been collected, sorted and tabulated, the executive is faced with perhaps his most difficult problem—summation. First of all he will examine the results produced by the survey to see if they conform with the objects of the survey and whether they are a reliable statement of the true facts. He will then sort them into categories and draw charts and graphs, etc., to show clearly the significant features of the results and, in most cases, will carry out specific statistical calculations to discover connections and trends. Finally, he will extract from this information the major salient points which will help him to present the results of the survey, so as to underline clearly the facts required. Having now arrived at the result of his efforts, he still has one last bridge to cross, in that he must convince the sponsors that he has in fact produced not only *a* result but *the* result.

There are two ways of presenting information to the sponsor. It can be allowed to emerge quietly over a meal or it can be presented to the appropriate individual or groups of individuals in a logical forceful and convincing manner. The latter is, of course, the most satisfactory way but, alas, not always the manner adopted. By far the most satisfactory method, is for the research executive to present his findings in person, with the aid of charts and diagrams, when he can then clear up any objections or misconceptions as they arise. He can subsequently prepare a detailed written report containing all the relative information upon which a judgment as to the reliability of results may be made.

The Market Research Society of Great Britain, the professional body of researchers in this country, has laid down certain specific rules as to what should be covered in a reliable and ethical research report. Certain of these provide, by their presence, a yardstick by which the relatively uninformed user of research can judge the authenticity of a survey. These are the detailed findings, bases upon which percentages are calculated; the size and nature of the sample; and the questionnaire which was used in the survey. If any of these are missing from the survey report they should be immediately requested.

In order to put market research into perspective with the gas industry's particular problems, it is useful to indicate very briefly some of the uses to which it might be put by a typical gas board:—Two obvious applications are, first, those connected with the consumer's use of gas and gas appliances and their reactions to the various services both in terms of installation and maintenance and the supply of new or reconditioned appliances; and second, the operation of showrooms and their relationship to new and potential users of the board's services. Much useful information can be obtained, also, to assist the production side, not only in estimating actual demand for gas and appliances, but also to provide them with information upon which to base campaigns to iron out seasonal fluctuations, which adversely affect production. In addition to these applications, research techniques can be used, as with many other product services, to measure the effectiveness of promotional activity. But whatever use research is put to, one salient fact should never be forgotten—markets are people and therefore market research is research among people—these people are all individuals and have all the characteristics of individuals. Market research, therefore, can tell much that is valuable about one's consumers, both new and potential, but can only do it in the hands of skilled researchers and in terms of the broader defined characteristics of the population.

# Feed Water Thermal Storage

C. F. WADE

EXCEPT in the case of many of the larger industrial undertakings, though not by any means in all of these, there is apparent little appreciation of the great possibilities in the adoption of thermal storage as a means of reducing fuel consumption and running costs.

One of the handicaps to the more widespread use of thermal storage systems is the inability to give a definite figure for the ultimate saving in fuel and other costs which will accrue by the installation of a correctly proportioned plant. This is, of course, an important factor when a fuel technologist or engineer is preparing any proposal for the consideration of his Board, the members of which are more than likely to be non-technical, and who wish to know exactly what cash return will result from the capital outlay involved. Summarized, the reasons for the substantial overall economy invariably realized by a thermal storage installation are:—

(1) Uniform firing rates under optimum combustion conditions over very considerable periods. (2) Reduction of labour costs due to the smaller boiler capacity required in operation. (3) Reduction of heat losses from boilers which would otherwise have to be kept on the line. (4) Elimination of stresses and strains as a result of constantly uniform conditions of temperature and pressure. (5) Fully automatic control of steam and fuel conditions.

The simplest system, and that calling for the lowest initial outlay, is the 'feed-water' or 'constant pressure heat accumulator' wherein variable steam demand is 'ironed out' by means of storage of steam heat in the feed water during periods of reduced demand and by the release of this stored heat where the demand for steam is increased. Conversely, in the case of fluctuations in the firing rate, unavoidable with waste-heat boilers, the heat storage equipment will operate in precisely the same manner, *i.e.*, it will maintain the ratio of heat demand to its supply at a uniform figure.

Feed-water thermal storage can be roughly divided into two types—the 'low pressure' and the 'high pressure' systems. However, no clear line of demarcation can be drawn between the two, since this distinction is mainly determined by the pressure under which the storage vessel can be operated.

The simplest form of feed-water heat storage consists of an ordinary but very well-lagged, tank to which has been added a set of water heating jets. These jets can be controlled either by hand or automatically in accordance with the variations in steam pressure, live steam being applied to the jets and the water temperature raised when the pressure reaches the blowing-off point for the safety valves. The steam is cut off when the pressure falls. The cold water supply to the tank must also be regulated by the steam pressure in a similar manner, so that the temperature in the feed tank is always as near to 212°F. as possible. By this means the fullest practicable advantage of constant hot feed is obtained.

Assuming incoming cold feed at 60°F. with steam pressure of 100 lb. per sq in., peak steam demands of about 12% above the average steaming rate can be met at constant pressure and firing rate even with such an elementary system as that described above. As with all methods of feed-water thermal storage, the duration of such peaks which can be dealt with under constant conditions, will be determined by the capacity of the tank, and the extent of the peak above average by the difference between incoming cold feed temperature and the saturation temperature of the water at boiler pressure. A low pressure system, such as that described, does not, obviously, relieve the boiler from any effects of feeding at below saturation temperature, and this can only be achieved by the enclosed, high pressure systems which operate throughout under full boiler pressure and temperature and which give the utmost advantages from every point of view.

The original Kiesselbach system was first introduced about 25 years ago, and wherever it was adopted, notably on the Continent, results greatly surpassed those which were anticipated from prior calculations. Development in this country has been severely handicapped by the fact that the system was introduced during the slump period of the early 'thirties. An additional adverse factor was the complication and extra capital cost involved in the special circulating system, which is an essential feature of the Kiesselbach patents and which requires a considerable amount of additional pipework and also an overflow pump. Before the introduction of the Kiesselbach system, at about the beginning of this century, the first practical system of thermal storage was introduced by Druitt Halpin who employed an extra steam and water drum installed above the normal boiler drums.

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# PROSPECTS IN CANADA

ENORMOUS wealth is piling up in Alberta, and has been doing so since the first big discovery of oil at Leduc in 1947. Close to the oil, gas was found. But only very recently has it been realized how plentiful are the supplies of this gas. In 1949 the Alberta Gas Conservation Board estimated disposable reserves at 4.3 mill. mill. cu.ft. By 1952 the estimate had gone up to 6.8 mill. mill. Later estimates in 1953 and 1954, rose to 11.5 and then to 13.5 mill. mill. cu.ft.

Now, in a report in the *Financial Times* entitled 'Dilemma for Canadian Gas,' it is revealed that this natural treasure has developed into a national problem. The Alberta provincial Government, which has control of the province's natural resources, at first wouldn't allow any of the natural gas to be sold outside the province. It hoped to attract industry to the gas. As a result some important industrial concerns, such as a big synthetic yarn plant and a plant for treating the copper-lead-zinc ores from the Lynn Lake mine in northern Manitoba, have settled in Alberta. They are, however, using by-products rather than the simple heating element. But because of the great increase in the estimate of the gas supplies, the producers, by and large, want to sell their gas as soon as they can, in the largest possible quantities, and to the nearest possible markets so that they get the largest return at the wells. The Canadian Government, which has jurisdiction as soon as the gas leaves the province, also wants to get it moving, but it also wants to make sure that Canada gets the full benefit rather than the United States cities which happen to be nearer. It is the ancient Canadian dilemma of preserving east-west ties, which are national, or north-south ties, which are continental. The Government agrees with east-west ties, and announced a policy of no-export until after eastern Canada had been served.

While the Canadian Government is trying to reconcile short-term financial realities with the long-term aims of national policy, it might be just as well for us in this country to make use of the breathing space by considering what profits we might gain from the prosperity that must surely accompany the sudden supply of such a stupendous quantity of gas of high calorific value.

A British business man, Major J. N. Watson, has been endeavouring for some time to set up in Canada a central selling organization on behalf of a large number of gas equipment manufacturers. For 18 months he has been in touch with the gas equipment industry in this country and its trade associations, and there is real enthusiasm for his idea.

In a recent article in *The Statist*, a British-Canadian official is quoted as having said: 'Over the last two or three years a new spirit has swept through Whitehall and the Bank of England. It is at last realized that an investment in Canada is better than a gold block in Fort Knox—and it produces more. That is why we recommend to the British Government and individual industrialists not to waste time upon increasing direct trade with Canada by methods which were appropriate during the first half of this century, but to get cracking with Canadian industry and to join it.'

## Atmospheric Investigation in Scotland

Wider investigation of atmospheric pollution is contemplated by Lanark County Council, who are proposing to establish seven observation stations at Carfin, Bellshill, Bailieston, Carmyle, Cambuslang, Blantyre, and Hawksland or Boghead reservoirs.

Commenting on the proposal in his annual report for 1954, Mr. A. C. Wilson, public analyst and chemist for Lanarkshire, said that there will be difficulty in finding sufficient qualified staff for the work. He suggested that it might be wise for several local authorities to collaborate and form a joint committee to deal with the problem throughout the areas concerned. Mr. Wilson added that last year there was a marked increase in the amount of grit deposited in the Carmyle district. He was of the opinion that conditions would tend to deteriorate, as far as the amount of grit deposited is concerned, so long as production increased, unless the works concerned could devise improved methods of handling raw materials. By more stringent regulations the amount of sulphur burned into the air by one firm had been reduced by almost 900 tons in 1954.

## Belgian Gas

The annual meeting of the Belgian Gas Association (Association Royale des Gaziers Belges) was held on June 21 and 22, in Brussels, under the presidency of M. Auguste de Brouwer. The Institution of Gas Engineers was represented by its President.

The proceedings began with a warm welcome to the guests, to which M. Mougin of France replied. M. Touwaide then reviewed the activities of the Association during the past year, after which M. de Brouwer delivered his presidential address. M. Delbos of Gaz de France gave an absorbing address on 'Some Aspects of Gas Supply in France', in which he surveyed the whole range of fuel resources available, and showed how these were being integrated and developed with due regard to geographical factors.

The afternoon was devoted to the showing of two films made by Gaz de France. The members and visitors were unanimous in their praise of these productions, and especially of the outstanding quality of the colour. One film showed how the new pipe line was laid to bring into Paris surplus gas from the coke ovens of Lorraine, with some excellent shots of the welding, wrapping and laying of a steel pipe line. The second, of more immediate publicity value, set out to show how gas can provide comfort in the home, retracing the supply back to the gasworks, with all the processes involved in carbonization.

**A special sub-committee** to consider the question of atmospheric pollution in the Miles Platting area has been set up in Manchester.

## Loan for South Australian Gas

The South Australian Gas Company have recently issued a £(A)500,000 cash loan. The loan, the closing date for which was August 15, was available on a short-term basis—5 or 12 years at the applicant's option—and carried an interest rate of £(A)4 17s. 6d.% per annum. The loan is required by the Company to carry out extensions and reconstructions of capital works in order to meet the ever-increasing demand for gas in South Australia. It is stated in the prospectus that between 1951 and 1955, twice the number of appliances were sold than in the previous five years, and over the same period nearly twice the number of new consumers were connected.

## Oil-burning Boilers

Architects and heating engineers in Edinburgh had the opportunity recently of studying yet another symbol of the transition from the coal to the oil age, a new fully automatic oil-fired boiler, specially designed to supply hot water and central heating in blocks of flats, hotels, offices, laundrettes, and factories. It is the latest addition to the Potterton range of boilers, produced by the Gas Division of Thomas De La Rue & Co., Ltd., who arranged the demonstration in the city. The new boiler is compact in size and manufactured as a unit, complete with burner, thermostat, and other controls. The model demonstrated was in the 108,000 to 216,000 B.Th.U. an hour range, but it was explained that larger boilers capable of producing from 252,000 to 288,000 B.Th.U. an hour will be available later in the autumn.

Mr. Ernest Brooks, General Manager of the Gas Division, said that the boiler was much more economical than a solid fuel boiler converted to oil firing. He claimed that it was 78% efficient and produced no smoke. It was simple to instal and would operate for months without attention.

## Feeding the Multitude

An interesting catering installation was carried out recently by the North Thames Gas Board in connection with the world-wide five day Annual Convention of Jehovah's Witnesses held on the grounds of the Twickenham Rugby Football Club. Large marquees were erected on the ground, and faced with the problem of providing up to 20,000 lunches and teas and 10,000 breakfasts daily, the organizer, Mr. Ward of America, approached Mr. A. Williams, of the North Thames Headquarters Catering Staff.

Together they planned a self-contained all-gas kitchen containing, among other things, three 3-pan fish fryers, two 2-pan fish fryers, roasting and baking ovens, tea boilers, hot closets and boiling pans to a total capacity of 500 gal. Special high-capacity meters were installed and a 4-in. service run. Needless to say, these large scale catering arrangements went through without a hitch, everybody being fed well and on time. An interesting point is that the average amount of gas consumed came to 1½ cu.ft. per main meal served.

## Call for 'High Level' Talks

Mr. J. A. Derbyshire, manager of Bangor (Co. Down) Gas Undertaking, has suggested to the Borough Council that it should approach the Association of Municipal Authorities with a view to having a high level consultation with officials of the National Coal Board on coal prices. He felt it would be money well spent to send a deputation to London as the Northern Ireland Ministry of Commerce did not appear very helpful in explaining the discrepancies between the cost of coal at the pit head and to the Northern Ireland consumer.

Councillor S. Napier pointed out that the pit-head cost of coal was 61s. per ton, and when it reached the Northern Ireland consumer it was about £9 per ton. He felt it was time some strong action was taken on behalf of the Northern Ireland consumers. Mr. Derbyshire's suggestion will be discussed by the Council's Gas Committee, who may then decide to approach the Association of Municipal Authorities.

## Industrial Accident Prevention Conference

The Minister of Labour, Sir Walter Monckton, and three leading industrialists will speak at Guildhall on Friday, October 28, on the urgent necessity to reduce the number of accidents occurring in British industry.

Sir Ewart Smith, deputy chairman of I.C.I. and chairman of the British Productivity Council, will speak on *Accident Prevention and Productivity;* Mr. A. E. Amor, deputy managing director of Kodak, Ltd., on *Accident Prevention and Man-power;* and Mr. P. E. Trench, managing director of Bovis, Ltd., on *Accident Prevention and Efficiency*, with particular reference to the building industry.

The conference is the principal event of National Industrial Safety Week, during which a campaign for safer working in British industry is being launched. The object of the campaign is to encourage all workers, but particularly young workers, to 'start a safety habit today', and to remember that 'safety habits last a lifetime'. During the launching week it is hoped to introduce these two slogans into every factory, large or small, throughout the United Kingdom. The campaign also sets out to bring into the voluntary safety movement a great number of the smaller industrial concerns which at present have little or no safety organization in their factories.

The conference is open to anyone interested in industrial accident prevention. Admission is by tickets only. These may be obtained from the Hon. Treasurer, Mr. H. Meanley, North Thames Gas Board, Kings Road, Fulham, London, S.W.6 at 10s. 6d. each.

## Opposition to Exclusive Contracts Required

Gas salesmen in Scotland have been critical recently of the apparent lack of opposition by housewives to proposals to contract supplies of domestic appliances to new housing estates on an exclusive basis. In many instances the housewives concerned are so glad to find a house that they accept as inevitable the appliances supplied, whether these suit them or not. Selling view is that opposition from consumers could easily swing the situation to the point where such exclusive arrangements were avoided and a free choice of appliances was available. Gas industry advertising already does much to tell the story but it lacks the pointed pressure that a group of individual women can bring to bear on the voting for installations on new housing contracts. Whether the organization of such groups is a feasible proposition remains to be seen but the present lack of such a body has probably been responsible for the loss of some important housing contracts.

## Revised British Standard

The British Standards Institution has just published standard 659: 1955 for light gauge copper tubes for water, gas, and sanitation, which is a revised edition of that first issued in 1936, and revised in 1944. The standard provides for tubes for the same applications as those covered by the previous edition, namely, tubes for water, gas and sanitation suitable for connection by compression fittings or capillary fittings, or by bronze or autogenous welding. The 1936 specification standardized the tubes on the basis of the outside diameter—the outside diameter selected for each size being arrived at by adding to the bore dimension twice the wall thickness then in most common use for the particular size.

The 1944 revision effected a reduction in the thicknesses of the tubes, the thicknesses in the earlier specification being regarded as more than adequate for the applications for which the tubes are intended. A separate table of dimensions was also included for tubes for sanitation which permitted, for the nominal sizes 2 in. and upwards, thinner wall thicknesses than those specified for water and gas. The outside diameters established in the first issue were retained in both tables in order to avoid disturbance of the existing ranges of fittings for connecting the tubes. A closer tolerance was specified on certain of the outside diameters.

In this present revision the method of designating tubes has been retained but that of expressing tolerances has been clarified; additional sizes, *viz.*, 5 in. and 6 in. have been included. The value of the tensile strength has been reduced from 17 to 16½ tons per sq. in. Other amendments are the introduction of a weight clause and a new method of marking the tubes. Copies of this standard may be obtained from the *British Standards Institution, 2, Park Street, London, W.1, price 2s. 6d. each.*

## NORTHERN BOARD'S MOBILE MARQUEE

*The illustration shows the front view of the Northern Gas Board's mobile marquee. The front is open but the interior is partly obscured by the figures of Mr. Therm and corded decoration.*

## Street Lighting Exhibition

The annual conference of the Association of Public Lighting Engineers and the exhibition of street lighting apparatus and equipment, will be opened on Tuesday, September 13, at the Leas Cliff Hall, Folkestone, by the Mayor of Folkestone. He will officially welcome the numerous members, delegates, and visitors, many of whom will be coming from Belgium, France, Holland, Israel, South Africa, Malaya, and Trinidad.

Mr. J. M. Waldram, the Senior Research Illuminating Engineer of G.E.C., will be inducted as President on the opening day of the conference. He read his first paper to the Association in 1927 and has been a member since 1935. Papers dealing with various aspects of street lighting will be presented.

The exhibition will be held in Langhorne Gardens, opposite the Conference Hall. Apart from the participation of many well known manufacturers, there will be a display of 100 lamp columns, steel and concrete, together with various items of road safety equipment.

## PRIZEWINNING LORRY

*This lorry, decorated by the Rhyl Undertaking of the Wales Gas Board, won first prize at the recent Prestatyn Carnival.*

# The stars of today . . .

. . . . . are created by public acclaim. Cinema audiences acclaim delightful Virginia McKenna, who features in the currently released film "The Ship that Died of Shame"– and housewives acclaim the Century Cooker, which features in thousands of modern kitchens throughout the British Isles.

The roles of these two stars in contemporary life are in widely differing fields, but the pre-eminence of both is the result of their fulfilling the exacting demands of their respective roles.

VIRGINIA McKENNA appears in the role of Helen, lovely screen wife of GEORGE BAKER and only girl in the Michael Balcon—Ealing Studios "THE SHIP THAT DIED OF SHAME". produced and directed by Michael Relph and Basil Dearden.

## Star features of the CENTURY

- ★ Vitreous enamelled surfaces throughout –cream exterior
- ★ Double platerack.
- ★ Used oven heat vented in front of backplate heats platerack
- ★ Four fast-boiling hot-plate burners—fixed stop for simmering
- ★ Quick-heating grill
- ★ Safety-type taps
- ★ Hotplate parts are removable
- ★ Roomy oven — base suitable for slow cooking
- ★ Mainstat oven heat control
- ★ Drop-type oven door
- ★ Oven lights from front by flash tube
- ★ Storage space in plinth base
- ★ Hotplate extensions and gas lighter supplied if required

R. & A. MAIN LIMITED
LONDON and FALKIRK

C43

The MAIN No. 20

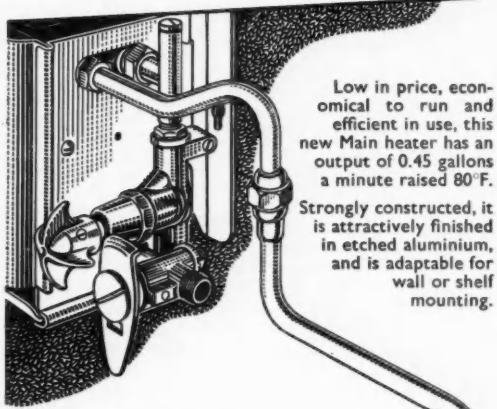
CENTURY

Cooker

Note the name - made by MAIN

the NEW water heater for single-point duty . . .

the MAIN MINIMAIN instantaneous GAS WATER HEATER



Low in price, economical to run and efficient in use, this new Main heater has an output of 0.45 gallons a minute raised 80°F.

Strongly constructed, it is attractively finished in etched aluminium, and is adaptable for wall or shelf mounting.

ACCESSORIES AVAILABLE

Products deflector ● Swivel outlet spout ● Gas Governor ● Interlocking Gas and Water Cocks complete with gas and water throttles and pilot light

low priced to meet popular demand

MAIN WATER HEATERS LTD.

Gothic Works, Thornton Road, Croydon, Surrey

W 34

# NEWS IN BRIEF

**Main line employees** of the Aberdeen area of the Scottish Gas Board have gone on strike following an incident at Oldmeldrum when, they allege, the Board failed to provide a meal on the job as has been the arrangement since 1931 when country jobs are involved.

**F. J. Collin,** A.G., of Dortmund, Germany, suppliers of coke oven, gasworks, and by-product plant, have formed a new company, F. J. Collin (U.K.), Ltd., to represent them in this country. The directors are Mr. P. Collin, and Mr. E. Jaque, with Mr. W. G. Carter as Manager. The address of the company is *9, Upper Belgrave Street, London, S.W.1, telephone SLOane 8172.*

**The Southern Gas Board** Sports League Finals Day was held at Reading on August 28. The meeting was presided over by Councillor A. E. Smith, J.P., who, besides being a member of the Board, is the Mayor of Reading. The Cricket League Cup was won by the Reading Undertaking, and the Bowls League Cup was won by the Aldershot Undertaking. The trophies were presented by the Mayoress.

**At the opening session** of the North Western Fuel Luncheon Club on Wednesday, October 19, to be held at the Manchester Engineers' Club, the Guest Speaker will be the Rt. Hon. Alfred Robens, M.P., under the Presidency of Colonel G. G. H. Bolton, M.B.E., who has accepted nomination for his third year of office. The Honorary Secretary and Treasurer is Mr. Sydney N. Duguid, J.P., F.INST.F., Brookfield Works, Elm Tree Road, Lymm, Warringham, Cheshire.

**'Chemical Engineering in Industrial Processes'** is the title of a course of six lectures on chemical engineering in industrial processes to be held in the Department of Chemistry and Dyeing at the Technical College, Bradford, 7 on Wednesdays from November 2 to December 7, at 7.30 p.m. The fee for the course which will cover such topics as process design, dyestuffs manufacture and the coal tar industry, will be £1 10s. Further particulars can be obtained from the Principal at the address given above.

**The National Industrial Fuel Efficiency Service** in conjunction with the Southern Regional Council for Further Education are holding a course 'Current Practice in Fuel Efficiency' at the Clarendon Laboratory, Oxford, from September 26 to 30. Applications for the course, which includes a comprehensive range of topics from handling and storage of fuels to waste heat recovery from diesel engines, should be made to Mr. E. S. Watkin, N.I.F.E.S., Southern and South-Western Area, *Ailsa House, 181, King's Road, Reading,* without delay.

**Trapped in a 3 ft. gap** between the tank and the wall of a gasholder in a fall at Spenborough gasworks, Cleckheaton, David Anderson (43), steel erector of Acre Mount, Middleton, Leeds, was rescued by firemen. He was working on scaffolding on top of the holder when he fell 30 ft. into the gap. Workmates were able to reach him by climbing through a hole inside the holder, but they could not get him out. Firemen lowered a stretcher, and after securing the injured man hauled him to the top of the holder by a line. A gas board official said: It was amazing that he lived. He fell a sheer 30 ft., and by a miracle must have missed a vertical ½ in. thick steel plate at the foot of the holder. Mr. Anderson is employed by Clayton, Son and Co., Ltd., of Hunslet, Leeds.

**Liverpool Street Lighting.** Liverpool ratepayers were last year called on to pay more than £4,200 to repair malicious damage done to street lamps and, during the past five years, similar damage has cost the city over £20,000. In order to impress on school children the dangers of this damage, members of the City Lighting Committee have been visiting schools and have spent a considerable sum on producing a film dealing with 'The Light that Failed' which has been exhibited in schools and in public cinemas.

There are in commission in the city 34,705 electric lamps and 10,866 gas lamps, and the committee is starting on a 10 to 15 years' scheme, involving the substitution of 11,000 gas lamps by 15,000 electric lamps, costing approximately £600,000.

**The Royal Sanitary Institute** has changed its name to the Royal Society for the Promotion of Health, and the designations of members are now as follows:—F.R.S.H.—Fellow (in place of F.R.San.I); M.R.S.H.—Member (in place of M.R.San.I.); A.R.S.H.—Associate (in place of A.R.San.I.); Affil.R.S.H.—Affiliate (in place of Affil.R.San.I.).

**The Post Office** has long recognized the wisdom of stimulating and encouraging the flow of suggestions from its staff. The Post Office 'Awards for Suggestions Scheme' which has been in existence since 1906, is designed to encourage the staff to think out and submit suggestions for the improvement of the many services which the department undertakes as a servant of the public. Every type of employee, no matter how young, is at liberty to submit a suggestion, which may relate to alterations in services offered by the department or in the equipment, material or procedure used in the performance of such services.

During the 49 years of operation the scheme has yielded good results. Up to the present more than 158,000 suggestions have been received and over £60,000 paid as awards. Many of the ideas, of course, come to nothing on expert examination, or have already been anticipated.

**George Royston & Son, Ltd.**—We feel that we should call the attention of our readers to the fact that both the sulphate of ammonia plants described in our last issue in the article, 'Sulphate of Ammonia Production on Tyneside', were manufactured by George Royston & Son, Ltd.

# Company News

## B.H.D. ENGINEERS, LTD.

The Directors of B.H.D. Engineers, Ltd., in their seventh annual report, recommend a final dividend of 12½%, making with the interim paid in February a total of 17½% for the year ended March 31. After crediting income from investments and transfer fees and after charging depreciation, taxation, and all other expenses of a revenue nature, the group trading profit was £191,518, against £156,844 for the previous year. The available balance is £273,485, against £217,886, and it is proposed to transfer £136,470 to general reserve (against £121,758), leaving £82,362 to be carried forward against £51,510 brought in. Since the last balance sheet the authorized ordinary capital of the Company has been increased from £350,000 to £500,000, and the sum of £161,318 has been capitalized and issued by way of bonus in the form of 322,637 fully paid ordinary 10s. shares. There are capital commitments, not provided for, estimated at £124,102.

## POWELL DUFFRYN

The directors of Powell Duffryn, Ltd., announce a final dividend of 10% on their ordinary shares for the year ending March 31, 1955. This is to be paid on October 8, and it will bring the total dividend for the year to 13%. The dividend on the 4¼% cumulative preference shares for the six months ending June 30, 1955, was paid on July 1. Total profits for the year amounted to £2,183,103. In his statement, Sir Herbert Merrett, the Chairman, said that once again he was unable to report that the National Coal Board had settled their account for compensation for the Company's valuable power stations. It seemed likely, however, that the matter would be settled before the end of the current trading year. He said that Powell Duffryn Technical Services, Ltd., was now being utilized to a greater extent than at any time in its history, and that it was proceeding satisfactorily with the development of mines in Korea. Other companies of the group were also contracting in the Far East.

# TRADE NEWS

## Tube cutting and screwing

RG machines are available in two sizes; the RG2 for tubes from ½ in. to 2 in. diameter, and the RG4 for tubes from ½ in. to 4 in. diameter. The manufacturers say that they have constructed the machines to enable easy movement from site to site and that their operation can be entrusted to unskilled labour or apprentices without possibility of damage being caused through incorrect usage. They are fitted with low horse power motors and, if so desired, they can be connected to ordinary household lighting circuits. All voltages are obtainable and the manufacturers can also supply petrol and compressed air driven models.

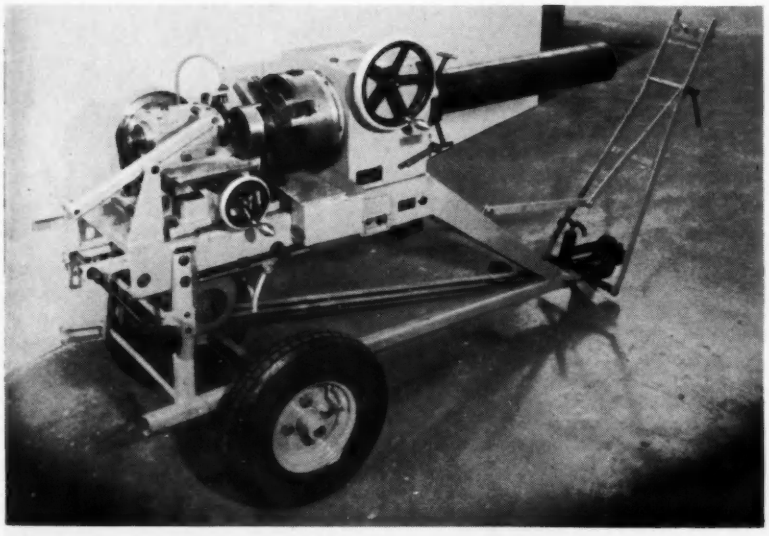
The drive from the motor is through a worm drive and a vee belt onto a saw and milling hob. The pipe to be cut and screwed is gripped in a three-jaw self centring chuck, and at each end of the machine are supports which can be adjusted to steady the tube while it is being cut or screwed. The cutting spindle is mounted on a sliding saddle. In operation the saw is advanced towards the pipe until it penetrates the wall thickness. The pipe is then rotated by turning the handwheel, which operates the chuck; thus any desired length can be cut off.

For the screwing operation the axis of the milling hob is slightly inclined to the pipe axis so that a taper thread ($\frac{1}{16}$ or $\frac{1}{32}$) is formed. By adjusting the position of the cutting spindle, parallel threads may also be cut. The depth of the thread is pre-set for any chosen pipe diameter by a stepped rotatable collar. This means that when changing over from one diameter pipe to another within the range of 1 in. to 2 in (RG2) and 1 in. to 4 in. (RG4), the adjustment can be made in one second. Only two milling hobs are required for the complete range of ½ in. to 4 in. The movement of a lever engages the cam ring which controls the pitch of thread, so that while the chuck is being rotated the pipe is gradually drawn away from the saw blade enabling the end of the thread to merge into the commencement at the correct pitch. Lubrication during the cutting and screwing operation is supplied by means of an automatic suds pump connected to the hub of the motor drive.

Average times, as claimed by the makers, for cutting and screwing of pipes are as follows:—

| | *Cutting* | *Screwing* |
|---|---|---|
| *½ in.* | *10 secs.* | *35 secs.* |
| *1 in.* | *15 „* | *1 min.* |
| *2 in.* | *35 „* | *1¼ „* |
| *4 in.* | *90 „* | *7 „* |

Bevelling cutters for bevelling pipes for welding are also available. One cutter is fitted to each side of the saw and a flange mounted on the hub of the cutting spindle controls the width of the vee cut to any desired depth. The use of these cutters is claimed to ensure that the pipe is squarely cut and bevelled, so preventing the possibility of welding material forming inside the tubing and causing blockage. Nipple holders for producing nipples from ½ in. to 3½ in. diameter can also be supplied. These holders are only necessary from 1½ in. to 3 in. in length.—*J. C. Neville, Ltd., 34, Priests Bridge, London, S.W.14.*



*RG4 tube cutting and screwing machine, mounted on a trailer and with an electric motor drive. A 4 in. pipe is shown in position for threading.*

## Rear dump wagon

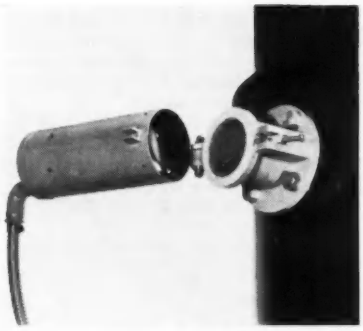
The Birtley Co., Ltd., Birtley, County Durham, which recently entered into a manufacturing agreement with Athey Products Corporation of Chicago, U.S.A., announces that the first equipment of the Athey range to be brought into production at its works at Birtley, will be the PR.21 rear dump wagon. This is designed to operate in association with the DW.21 wheeled Tractor produced by the Caterpillar Tractor Co. An innovation in the earth moving field of construction, it is claimed the PR.21 and DW.21 can haul at 20 m.p.h. loads of 28 tons. The wide, open topped hopper has a capacity of 22.5 cu. yards heaped on a 1 in 2 slope. The hopper is said to provide an easy target for shovels, draglines or any type of loading equipment, no valuable time being lost in positioning under the shovel. The hopper opening is 14 ft. by 9 ft. and a sturdy box-beam section around the top, sides and rear of the body allows lip loading without damage. The operator has complete protection with a wide shield at the front of the body. The construction of the PR.21 is claimed to be of a strength that will withstand the impact of big, hard rock. The all welded body has a 3-layer bottom built up to ⅜ in. steel lower plate, an oak shock absorbing layer and ¼ in. steel top plate. Hydraulic hoists tilt the trailer body to 60°, providing fast, clean dumping of any material well clear of the tyres. It is claimed that a heaped load can be ejected in 18 seconds. Power for the hoists is provided by a pump situated on the rear of the tractor. The body pivots on the draftbeam and the tilting operation is effected by braking the rear wheels, when the tractor draws towards them or, alternatively, by braking the front wheels the rear wheels are drawn towards the tractor as the load is dumped.

*PR.21 rear dump wagon with DW.21 tractor.*

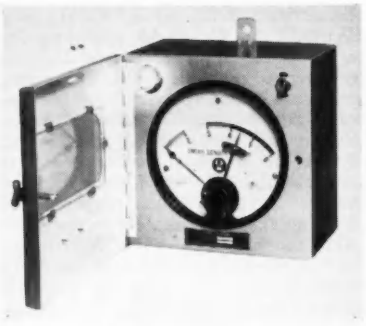
The dumper track is 115 in. which with low centre of gravity provides exceptional stability. The DW.21 tractor is powered by a six-cylinder CAT diesel engine of 275 BHP with five travelling speeds, from 2.16 to 20 m.p.h. The hydraulic steering is positive at all speeds and 90° turning gives non-stop turns in 34 ft. Timing gears assure correct angle between tractor and dump wagon. The weight of the tractor is 27,200 lb. and the dump wagon 33,000 lb. unladen.—*Birtley Co., Ltd., Birtley, Co. Durham.*

## Smoke density indicator

The makers of the Electricon smoke density indicator, type CSB, write to say that the instrument is now finding itself a welcome place in boiler house instrumentation. They claim that the indica-



*The optical unit of the Electricon smoke density indicator, type CSB, in position and ready for operation.*



*The indicator unit of the smoke density indicator housed in its illuminated case. It is also available for panel mounting.*

tion given by continuous observation of the concentration of particles in the flue gases serves to give invaluable information on combustion conditions. This is due to the considerable variation of smoke density which occurs over a range in which the $CO_2$ content remains particularly constant even though insufficient air, or excess air might be present. They say that the advantage of this very sensitive indication becomes apparent where $CO_2$ recording instruments are already installed as the charts show a considerably stabilized reading.

The indicator is operated by means of a photo-electric system based on precision type vacuum cells and a double valve stabilized amplifier. A beam of light is passed through the stack or flue and an accurate indication is given on a 6 in. dial of the density of smoke passing through. The optical system is kept clean by a slight air flow past the lenses, and no mechanical moving part or water spraying is necessary. Routine cleaning can be carried out by semi-skilled labour without upsetting the calibration of the system due to the use of extremely robust and accurately hinged projector and receiver units. A balanced (internal reference beam) optical system is used, which, it is claimed, results in the calibration remaining accurate as the beam-producing lamp deteriorates with use.—*Ronald Trist & Co., Ltd., Bath Rd., Slough, Bucks.*

## Accurate process timing

Most of the processes used in industry depend on the accurate control of time to give products of uniformly high quality.

The 'Horameter' soon to be introduced by Target Services is a simple but robust summating counter registering time in 1/10 hours up to 10,000 hours, when it automatically resets to zero. Fractions of an hour are indicated in red numerals. A rotating 'rising sun' disc shows at a glance when the instrument is working.

'Horameters,' it is claimed, can be used to indicate not only the duration of operation of an entire plant, but, by using several instruments, a detailed

*The 'Horameter' timer.*

analysis of process times can be obtained. Quenching, curing and baking times, fan operation, tumbling, crushing, grinding, soaking, plating, pumping and many other operations can be accurately and automatically timed.

The 'Horameter' incorporates an electromagnet instead of a synchronous motor, to ensure greater robustness and reliability in service. The electromagnet winds up a clockwork at regular intervals. The clockwork only registers while the electromagnet is energized. Models for operation at 6, 12/24 or 110 V D.C. and 110 or 220 V A.C. are available. The instrument can also be used on plant and machinery powered by steam, gas or oil by providing a small battery and using it in conjunction with a switch actuated by the equipment to be timed.

The small size of the 'Horameter' contributes to its flexibility. It is only 2⅛ in. in diameter and 3¼ in. deep and weighs 19 oz. It can be screw-mounted by means of flat or angle brackets available as optional extras, or flush-mounted in casings or panels with the U-piece supplied for this purpose.

The instrument is lubricated, calibrated and sealed before despatch and requires no service. It is supplied with 2½ ft. of two-core cable through a watertight gland, ready for connection, or with tamper-proof terminal clamps to which cables laid in conduit can be connected. Cables of any length can of course be used if required, so that all 'Horameters' timing the individual processes in an extended plant can be grouped on a central control panel. The initial cost is low, power consumption is negligible and no maintenance is required, so that the rate of amortization is exceptionally high.

The instruments are resistant to cold, heat, vibration and corrosive atmospheres within wide limits.—*Target Services, 6-11, Dorset Close, Gloucester Place, London, N.W.1.*

## Polyvinyl chloride

The use of polyvinyl chloride (PVC) materials is rapidly increasing. The National Coal Board is replacing all conveyor belts made of the old conventional materials with those made with PVC. One conveyor belt made with Geon PVC has been used to convey coke for over twelve months and it is claimed to be still in excellent condition. The average life of the rubber belt previously used for the same job was only six weeks. Geon claim that not only is PVC belting tougher and more durable than rubber belting but it has the unique advantage of being flame-resistant as well.

A recent publication, entitled *Geon at Work*, fully illustrates, by means of a selected series of trade press advertisements, the various properties and useful applications of PVC. It is published by *British Geon, Ltd., Devonshire House, Piccadilly, London, W.1.*

## Instantaneous water heater

The manufacture of a new Ensign instantaneous gas water heater is announced by Meters, Ltd. It is of the broken-feed type, suitable for direct connection to the water main or to a service tank and, being of the non-coil type, it is claimed that no descaling is necessary. Gas and water pipes may be fitted invisibly or attached to a wall face. The outer body is of steel, finished in white or cream vitreous enamel, and the heat exchangers are of anodized aluminium.

The Ensign heater is said to be equally suitable for use with either hard or soft water and its maintenance is only a matter of a few minutes' occasional

*A new instantaneous gas water heater.*

cleaning. It is claimed to be very economical in use as no fuel is wasted in heating for storage and it uses gas only when providing hot water. On opening the water tap there is an immediate and continuous supply of very hot water. It is further claimed that no other method of water heating is capable of such a performance, except at a much higher cost.—*Meters, Ltd., 51, King St., Manchester, 2.*

# Welded Steelwork

For all electrically welded structures; steel buildings: tanks; pressure vessels and all classes of structural steelwork call in Robert Watson.

## by ROBERT WATSON

**ROBERT WATSON** (Constructional Engineers) Ltd., **BOLTON, LANCS.**
Telephone: Bolton 5125 (5 lines) Telegrams: Steelwork, Bolton.
**BRISTOL OFFICE:** Filton, Nr. Bristol. Filton 2361.
**LONDON OFFICE:** 2, 3 & 5, Studio Place, Kinnerton Street, Knightsbridge, S.W.1. SLOane 0658/9.

# BROADBENT

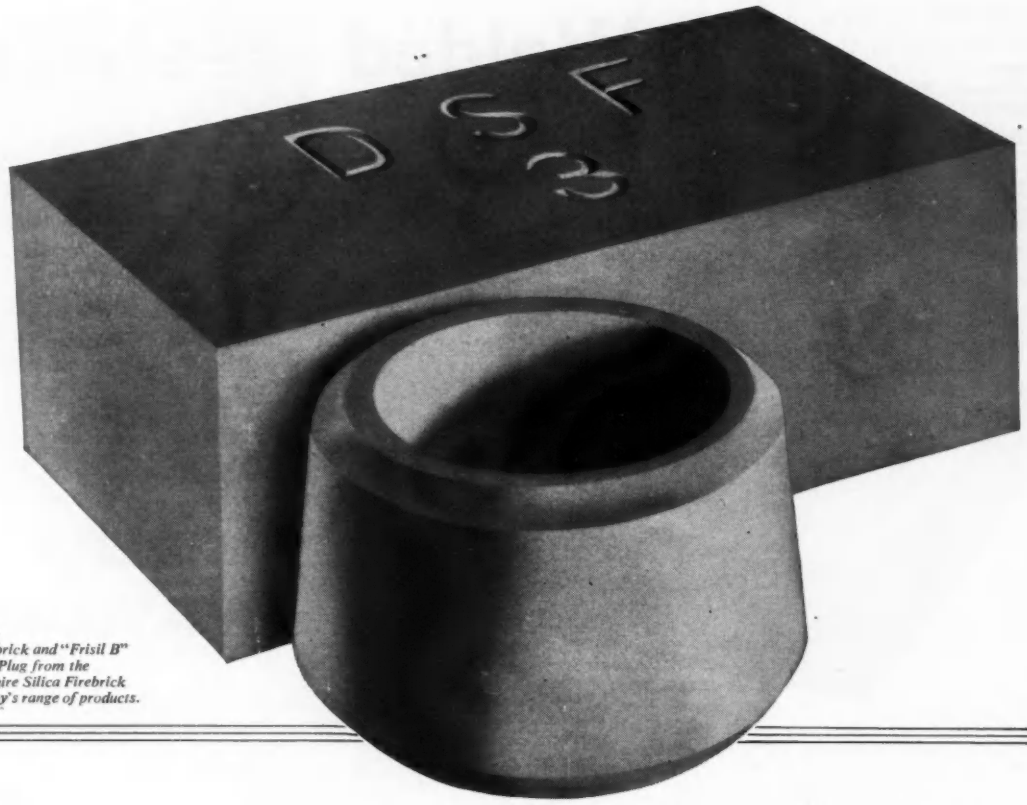
HIGH SPEED

# CENTRIFUGALS

STANDARD TYPE MACHINES
DRIVEN BY
DIRECT COUPLED MOTOR
OR
SEPARATE MOTOR
WITH
BOTTOM DISCHARGE
BASKETS
FABRICATED FROM
MILD STEEL, STAINLESS STEEL
MONEL, COPPER, ETC.

*80 Years' Reputation for Reliability*

**THOMAS BROADBENT & SONS, LTD.**
**HUDDERSFIELD**
*DISTRICT OFFICES AT*
LONDON · BRISTOL · LEICESTER · MANCHESTER · NEWCASTLE




D.S.F.3
*Square brick and "Frisil B" Nostril Plug from the Derbyshire Silica Firebrick Company's range of products.*

# The greater the insistence on furnace efficiency, the greater the need for

# DERBYSHIRE SILICA REFRACTORIES

**DERBYSHIRE "S" and "D.S.F."**
*(90% Silica)*

Refractories for all purposes including Vertical and Horizontal Retorts, Soakers, Puddling Furnaces, Reheating and Annealing Furnaces, Forge Furnaces, Checkers, Cupolas and Glass Furnaces.

*Other D.S.F. products include*
PEAKSIL *(95% Silica)* FRISIL *(Sillimanite)*
DUROSIL
*(The new British Plastic Refractory)*
and DOME INSULATION *(Diatomite)*

DSF
**DERBYSHIRE SILICA FIREBRICK CO., LTD.**
FRIDEN · HARTINGTON · NEAR BUXTON · DERBYSHIRE
Grams: Silica, Friden, Hartington. 'Phone: Youlgrave 271 (3 lines)

T.A. 4273

NEW

# ESSEX

## COMBINATION FLANGE

### FOR CYLINDERS AND TANKS

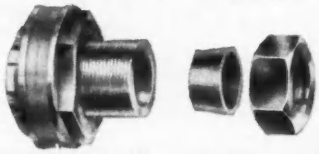
The combining of two fittings, i.e. the "Essex" flange and the standard union connection, provides the Fitter with the ideal connection between service pipe and cylinder or tank when installing H.W. Circulators.

It is no longer necessary to purchase two separate fittings. The "Essex" flange is now obtainable combined with the pipe union as one complete connection.

**Two in One** **Packed in carton Complete and Ready to use.**

***The NEW ESSEX COMBINATION FLANGE means Less Cost—More Efficiency—Less Trouble***

*Illustration shows—Flange complete with cone and hex. nut for L.G. copper pipe*



*Also obtainable with bent or straight tails for lead pipe.*

**ESSEX PARTNERS LIMITED**

**67 BRIDGEWATER STREET · LIVERPOOL, 1**

*Obtain further particulars from your usual supplier*

LINDIBOLT

### PATENT SELF-HEADING BOLT

For repairs to plating etc., etc. where only ONE SIDE of the work is accessible.

**FROM STOCK**
in mild steel in eight sizes $\frac{1}{4}$"— 1" each in four lengths

### CREATES ITS OWN HEAD

Is nearly as strong as an ordinary bolt of the same size.

Descriptive circular and samples, on request. Special sizes, also Lindibolts in non-ferrous at short notice.

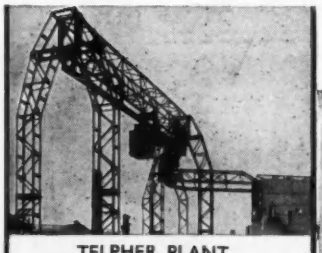
# HENRY LINDSAY LTD.

P.O. Box No. 97

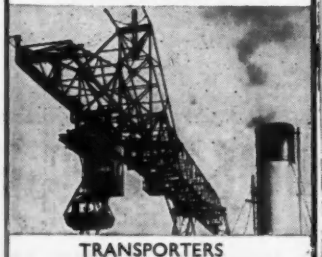
**Mansfield Road, Bradford 8, Yorkshire**

*Telephone: Bradford 41251 (3 lines)* *Telegrams: Lindsay Phone Bradford*

***Makers of the Lindapter Patent Bolt Adapter***



TELPHER PLANT

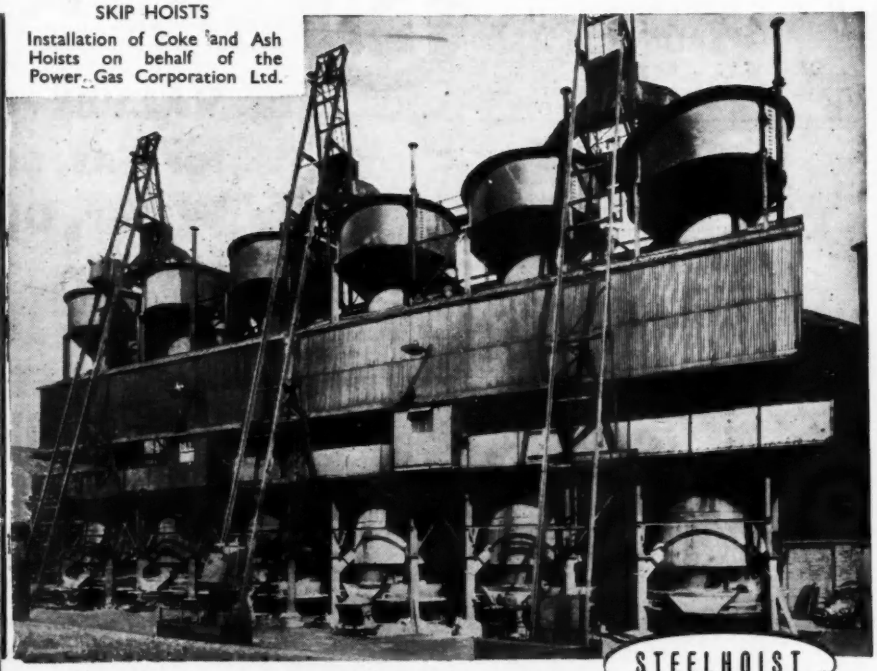


TRANSPORTERS

WAGON TIPPLERS

SKIP HOISTS

Installation of Coke and Ash Hoists on behalf of the Power Gas Corporation Ltd.



*Plant for the movement of material in bulk*

# STRACHAN & HENSHAW LTD

STEELHOIST

Steelhoist Works. Bristol 2. Tel: 78331.

AMAL

*Calibrated Jets & Injectors*
to meet a specification of consumption
AMAL LTD., HOLDFORD ROAD, WITTON, BIRMINGHAM, 6

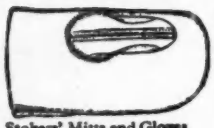
**THOMAS BAYLEY (GREAT BRIDGE) LTD.**
BAGNALL STREET, GREAT BRIDGE, STAFFS.
Telephone: 1587 Tipton
*Manufacturers of Best Staffordshire Blue, Brown and Red Engineering Bricks*
Blue pressed and Wirecut Paviors for Hopper Linings and Retort House Floors

**EWART CHAINBELT CO., LTD.**
DERBY, ENGLAND
Driving and Conveyor Chains of the best quality; made of Ley's Celebrated Blackheart Malleable Iron.
ALSO COMPLETE CONVEYORS AND ELEVATORS

**THOMAS BUGDEN & CO.**
India-Rubber and Airproof Manufacturers and General Contractors.
LARGEST MANUFACTURERS OF GAS MAIN BAGS.
Telegrams—"AIRPROOF, BARB, LONDON." Telephone—6147 CLERKENWELL
*Contractors to H.M. Government*

Gas Bags for Repairing Mains
PATENTEES OF THE
DENMAR BAG
Impervious to Main Liquor and Climatic Influences.

Round or Cylinder Shape.
Pull-through and Expanding MAIN STOPPERS.
All types of INDIA-RUBBER BOOTS.
DRAIN RODS AND WHALE-BONE BRUSHES.
HOSE AND TUBING FOR ALL PURPOSES.

Contractors' & Miners' Woollen Jackets, Trousers, Hats, &c.

Stokers' Mitts and Gloves of every description.
244, Goswell Road, LONDON, E.C.1.

WELDING
GUNNING
SPRAYING
OF GAS RETORTS
EB
*Write for particulars of how E. B. Service can help in reducing maintenance costs. Manufacturers of all types of Cements.*
E. B. REFRACTORY CEMENT CO. LTD.
*Oakfield Offices, Brettell Lane, Stourbridge*

CRANE
**VALVES for Gas, Steam, Water, Oil and Air**

**"THE DOUGLAS PUMP"**
SHEWN FITTED WITH SUCTION PIPE LINE STRAINER, GIVING CHOICE OF TWO SUCTION LINES, PUMP & STRAINER STEAM HEATED. GOOD SUCTION. SLOW SPEED.
**WILLIAM DOUGLAS & SONS LTD., PUTNEY - - LONDON, S.W.15.**

# PUBLISHERS' NOTICE

The " Gas Journal " is published every Wednesday, price **1/3d.**; by post **1/5d.**

**Subscription Rates:** Home and Empire:—**52/-** per annum; Foreign:—**60/-** per annum. (Both payable in advance.) A copy of the " Gas Journal " Calendar & Directory is presented each year to continuous subscribers.

**Classified Advertisements:** All small classified advertisements are charged at **2/-** per line (approx. **7** words)—minimum charge **10/-**. A Box Number address occupies **2** lines, and a further **6d.** is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

**Displayed Advertisements:** Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received **14** days prior to publication if proofs are required. Type area of inside pages **10** in. deep × **7** in. wide; block screen **120**.

**BUSINESS MANAGER: S. T. CULLEN**

MIDLANDS MANAGER: G. B. Torrance, 42, Wychall Lane, King's Norton, Birmingham, 30. *Telephone:* King's Norton 3868.

NORTHERN MANAGER: Philip W. B. King, Flat 1, 7 Langcliffe Avenue, Harrogate. *Telephone:* Harrogate 67625.

SOUTHERN REPRESENTATIVE: A. Engelhardt, 11, Bolt Court, Fleet Street, E.C.4. *Telephone:* Fleet Street 2236-7.

**WALTER KING, LTD., 11, Bolt Court, Fleet Street, London, E.C.4.**

*Telephone:* FLEet Street 2236-7. *Telegrams:* Gasking, Fleet, London.



**OXIDE**

DUTCH AND DANISH BOG ORE
SPECIALLY ACTIVATED OXIDE OF IRON

Oxide supplied on loan or sale outright.
Highest prices paid for Spent Oxide

Send your enquiries to

**GAS PURIFICATION LIMITED**

**PALMERSTON HOUSE, BISHOPSGATE, LONDON, E.C.2.**

Telegrams: "Purification, Stock, London." Telephone: London Wall 7938/9 & 7930

**MUST WE BE HEROES ?**

And fight the Fire Fiend without NU-SWIFT? But why? Even the Royal Navy don't do that. Please send us details of your wonderfully rapid and reliable Fire Extinguishers—BEFORE IT IS TOO LATE!

Name.....
Address.....
Post NOW to Nu-Swift Ltd. 25 Piccadilly W.1.

*In Every Ship of the Royal Navy*

**"KLEENOFF"** *
THE COOKER CLEANER

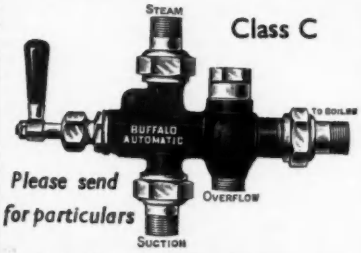
**"KLEENOFF"**
FIBRE BRUSHES
RUBBER MOPS

**"KAY-DEE"** *
KETTLE DESCALER

*For resale to the public and in bulk for works use.*

**BALE & CHURCH, LTD.**
CROMPTON WAY, CRAWLEY, SUSSEX

**BUFFALO INJECTORS**




**GREEN & BOULDING, Ltd.**
**162a Dalston Lane, London, E.8**

**PUBLICATIONS**

**GAS ACCOUNT CALCULATORS**

**SUPPLIED either by Price per Therm or Thousand, for any specified Calorific Value, in book form, office charts, or pocket charts for Meter Inspectors, printed in clear type. Write for particulars to F. H. WAKELIN, LTD., Calculator Specialists, 354, WHEELER STREET, BIRMINGHAM.**

**'Phone: Northern 0989. 'Grams: Reckoners, B'ham.**

**THE BRITISH GAS PURIFYING MATERIALS CO., LTD.**

**NATURAL BRITISH.**

**BOG (DUTCH and DANISH) ORE.**

**SPENT OXIDE.**

**LONDON ROAD, LEICESTER.**

**Telegrams: "BRIPURIMAT"**
**Telephone: 59086**


## APPOINTMENTS VACANT

*The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.*

**NORTH WESTERN GAS BOARD**

LIVERPOOL GROUP
ENGINEERING DRAUGHTSMAN

**APPLICATIONS are invited for the above pensionable appointment at a salary within Grades A.P.T. 6/8 (£565-£740 per annum) according to experience.**

Applicants should have had a sound engineering training. Experience in the design and construction of gas works, chemical plant or building construction would be desirable but is not essential. A knowledge of reinforced concrete and structural steelwork would be an added advantage.

Applications should be made on the official form obtainable from the Chief Personnel Officer, North Western Gas Board (Liverpool Group), Radiant House, Bold Street, Liverpool, 1, and returned to him within 14 days.

**WEST MIDLANDS GAS BOARD**

SEDGLEY DISTRICT
FIRST-CLASS GASFITTER

**APPLICANTS must be fully experienced and** capable of dealing with all types of gasfitting work and appliances. The duties will include attendance to emergencies outside normal working hours for which payment will be made in accordance with the Joint Industrial Council Scheme.

A house attached to the Showroom will be available at a reasonable rental.

Applications, stating age, qualifications, experience and present position, should be addressed to Mr. O. S. Brettle, Engineer and Manager, West Midlands Gas Board, Sedgley District, Lower Gornal, near Dudley, to reach him within seven days of the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

**WEST MIDLANDS GAS BOARD**

WOLVERHAMPTON AND DISTRICT DIVISION
DRAUGHTSMAN
DIVISIONAL ENGINEER'S OFFICE, DUDLEY

**CANDIDATES should have had experience in engi-**neering draughtsmanship, structural and building work. They should be capable of carrying out surveys and the preparation of drawings, specifications and estimates. The minimum qualifications expected will be of Higher National Certificate standard.

The salary will be within Grade 9 (£700-£800 per annum) of the National Salary Scales for Gas Staffs.

The appointment is superannuable and the successful candidate may be required to pass a medical examination.

Applications stating age, qualifications and experience, together with the names of two referees, should be addressed to Mr. Stanley Jones, Divisional General Manager, West Midlands Gas Board, Kensington House, Bath Street, Dudley, to reach him within fifteen days of the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

(*Classified advertisements continued on page* 652)

## APPOINTMENTS VACANT (ctd.)

**A VACANCY exists for a Design Draughtsman in** the Development Section of a Birmingham Company, manufacturing brasswork for domestic gas appliances. Staff Pension Scheme. Canteen. Applications stating age, details of experience and salary required to No. 255, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

**DESIGNER aged 25 to 40 required for work in new** and expanding field of dust control. Successful applicant will eventually be responsible for complete design of dust control and ventilation systems and equipment. Applicants should be at least H.N.C. standard and should have served an engineering apprenticeship. Previous experience of this kind of work desirable but not essential. Starting salary according to age and experience. Reply in writing, stating age, qualifications, experience and present salary to W. C. Holmes & Co., Ltd., Huddersfield.

**DRAUGHTSMEN.—Applications are invited from** Senior and Junior Draughtsmen to fill positions which have resulted from our expanding commitments. The work would involve the design and detailing of welded fabrications, pipework and light steel structures in connection with major installations. Excellent prospects of subsequent promotion exist for persons having initiative and an ability to accept responsibility. Candidates should apply in writing to W. C. Holmes & Co., Ltd., Huddersfield, giving full details of previous experience, etc.

**DESIGNER aged 25 to 40 required for work in** new and expanding field of dust control. Successful applicant will eventually be responsible for complete design of welded fabrications associated with dust control. Applicants should be at least H.N.C. standard and should have served an engineering apprenticeship. Previous experience of this kind of work in connection with chemical and gas plant and some electrical knowledge desirable. Starting salary according to age and experience. Reply in writing stating age, qualifications, experience and present salary to W. C. Holmes & Co., Ltd., Huddersfield.

### LIMERICK CORPORATION

VACANCY FOR ASSISTANT GAS ENGINEER

**APPLICATION forms and particulars from the** Secretary, Local Appointments Commission, 45, Upper O'Connell Street, Dublin, Ireland. Salary Scale: £845-£1,035, inclusive of temporary bonus. Higher initial salary in certain circumstances. Essential qualifications include satisfactory supervisory experience in a gas manufacturing undertaking. Special arrangements in regard to the interview of candidates resident in Britain. Latest time for receiving completed application forms: 5.0 p.m. on October 7, 1955.

### COLLEGE OF TECHNOLOGY, BIRMINGHAM

**APPLICATIONS are invited for the appointment** of an ASSISTANT TEACHER (Grade 'B') responsible for GAS FITTING. Candidates should have wide practical experience in the subject and some teaching experience.

Salary will be in accordance with the Burnham (Further Education) Scale for Assistants Grade 'B' (Men) £525 × £25 (final increment £20)—£820 with additional graduate and training allowances where applicable. In fixing the commencing salary, account will be taken of teaching and industrial experience.

Further particulars and form of application may be obtained from the Registrar, College of Technology, Suffolk Street, Birmingham, 1, on receipt of stamped addressed foolscap envelope. Completed forms should be returned to him not later than two weeks after the appearance of this advertisement.

K. R. PILLING,
Clerk to the Governing Body.

### SCOTTISH GAS BOARD

ALLOA/STIRLING SUB-GROUP—STIRLING DISTRICT
WORKS TECHNICAL ASSISTANT

**APPLICATIONS are invited from qualified persons** for the above appointment at Stirling Gas Works. Candidates should be experienced in the operation of continuous vertical retorts, C.W.G., and modern ancillary plant.

The salary will be within Grade A.P.T. 6 (£565-£645 per annum) of the National Provincial 'A' Salary Scales for Gas Staffs. The post is superannuable and the successful candidate may require to pass a medical examination.

Applications stating age, education, training, qualifications and experience, should be sent to the undersigned to arrive not later than Thursday, September 15, 1955.

W. M. GLEDHILL,
Sub-Group Manager.

Thistle Street,
Stirling.

### SOUTH WESTERN GAS BOARD

BRISTOL/BATH DIVISION
APPOINTMENT OF ASSISTANT STATION ENGINEER

**APPLICATIONS are invited for the above post at** the Avon Street Works, Bristol. The appointment is graded A.P.T. 11 (£785-£910) per annum.

Applicants should have had first-class training and considerable experience in Gas Manufacture. Associate Membership of the Institution of Gas Engineers is a necessary qualification. The Works has a capacity of 6 million cubic feet daily of Horizontal and Water Gas.

A Flat in an excellent residential district is available at a suitable rental.

Applications, accompanied by the names of two referees should be received by the undersigned not later than Saturday, September 17, 1955.

CHARLES R. INGHAM,
Production Engineer & Manager.

Radiant House,
Bristol, 1.

### EASTERN GAS BOARD

(TOTTENHAM DIVISION)
DEPUTY INDUSTRIAL SALES MANAGER

**APPLICATIONS are invited from suitably qualified** persons for the appointment of DEPUTY INDUSTRIAL SALES MANAGER.

Applicants should be Corporate Members of the Institution of Gas Engineers or possess other acceptable qualification. They should be used to dealing with all classes of industrialists and capable of assessing and exploiting opportunities for the application of gas to industrial processes, preparing quotations for gas installations and appliances, negotiating and completing sales and supervising installation work.

It is highly desirable that the applicants are experienced in the design of special industrial gas apparatus and central heating installations.

The duties will include, from time to time, the supervision of the technical, clerical and manual staffs.

The commencing salary will not be less than £1,000 per annum.

The successful candidate may be required to pass a medical examination and, unless already subject to a Pension Scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required, if eligible, to join the Board's Staff Pension Scheme within six months from taking up the appointment.

Applications, stating age, qualifications and experience, should reach the Divisional Personnel Manager, Woodall House, 658, Lordship Lane, Wood Green, N.22, not later than September 16, 1955.

### NORTHERN GAS BOARD

DARLINGTON DIVISION
TECHNICAL ASSISTANT

**APPLICATIONS are invited for the positi** TECHNICAL ASSISTANT at the Darlington Un

Candidates should have experience with Cont Vertical Retorts, Carburetted Water Gas an Ancillary Plant.

Preference will be given to applicants holdi Ordinary Grade Certificate of the Institution o Engineers or equivalent, and the successful ap will be required to undertake some shift du

The post is pensionable, and the successful can will be required to pass a medical examinat

Conditions of service are in accordance wit the National Joint Council for Gas Staffs Agree salary—Provincial 'A,' Grade APT. 6—£56 per annum, initial placing according to experi plus an allowance for shift duties.

Applications, stating age, qualifications an experience, together with the names of two re should be addressed to Mr. Charles Hindle, Sub Divisional Manager, Northern Gas Board, Darlingto Division, Gas Offices, John Street, Darlington, n later than September 17, 1955.

F. WILSON,
Divisional General Manager

### SOUTHERN GAS BOARD

CENTRAL DIVISION
NEWBURY UNDERTAKING
TECHNICAL ASSISTANT

**APPLICATIONS are invited for the post o** TECHNICAL ASSISTANT at the Newbu Works at a salary within Grade A.P.T. 5 (Provinci A) of the National Salary Scales (£530-£610 p annum).

Candidates should have had practical experience o modern manufacturing and laboratory practice pr ferably with continuous vertical retort plant and th usual ancillary processes.

The post is pensionable and the successful appl cant will be required to pass a medical examinatio

Applications stating age and experience and giving details of training and the names of two referees should reach the undersigned not later than Septem ber 19, 1955.

ATHOL W. BROWN,
Group Manager.

P.O. Box No. 34,
King's Road,
Reading, Berks.
August 27, 1955.

## PATENTS

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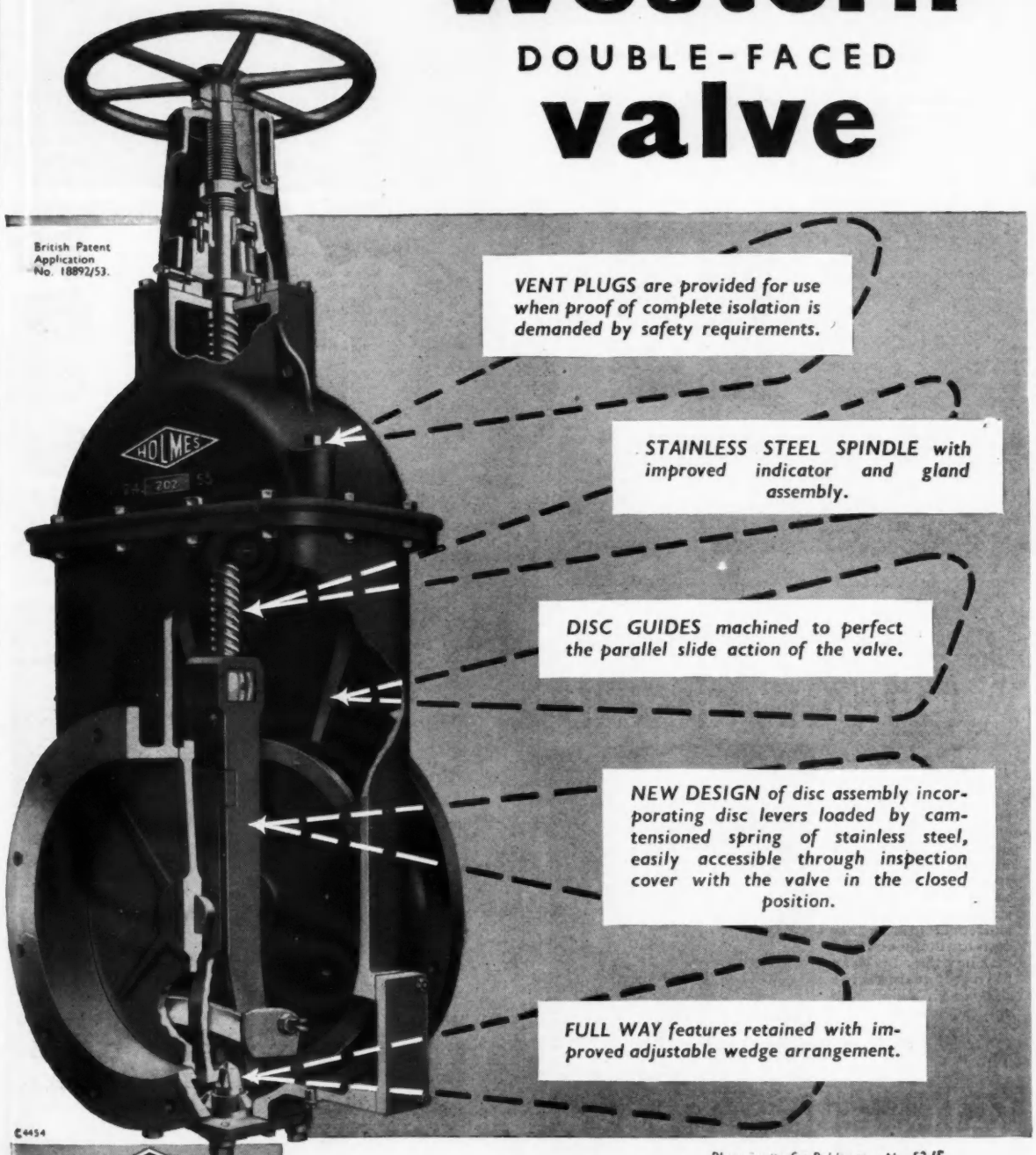
# *THE RE-DESIGNED Western DOUBLE-FACED valve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VENT PLUGS are provided for use when proof of complete isolation is demanded by safety requirements.
STAINLESS STEEL SPINDLE with improved indicator and gland assembly.
DISC GUIDES machined to perfect the parallel slide action of the valve.
NEW DESIGN of disc assembly incorporating disc levers loaded by cam-tensioned spring of stainless steel, easily accessible through inspection cover with the valve in the closed position.
FULL WAY features retained with improved adjustable wedge arrangement.

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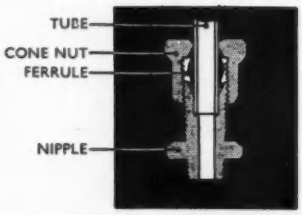
**DIRECT COUPLED COMPRESSORS** (see *illustration right*) *are fitted with automatic internal by-pass valves and lubrication systems. They are direct coupled to Keith Blackman motors. Type OA compressors in this range occupy a floor space of only 18" × 7½".*
**CAPACITY RANGE:** *100 to 750 cub. ft. of gas or air per hour at 3 lbs. per sq. in. pressure.*

**TYPE 4 COMPRESSORS** (*not illustrated*) *are also fitted with automatic internal by-pass valves and lubricators. The complete unit includes motor and drive on a common bedplate, all of Keith Blackman manufacture.*
**CAPACITY RANGE:** *500 to 20,000 cub. ft. of gas or air per hour at 3-5 lbs. per sq. in. pressure.*
**AREA OCCUPIED:** *from 9¼" × 16½" to 61" × 27".*

## DID YOU KNOW?

**KEITH BLACKMAN** have been making compression joints for many years and the present design embodies features developed as a result of this long experience. *Notice that the shape of the ferrule is such that the joint is made without unduly stressing the tube.*




## serving to burn

*Note: the four burner heads (right) are for high pressure gas, or low pressure gas and air blast.*

**LEFT: "Fishtail" type burner** *with two-armed stamped pattern injector for heating liquid in tanks by submerged combustion tubes. For use with low pressure gas supplies.* ***Size Range:*** *1", 1¼", 1½", 2" and 2½" outlets.* ***Capacity Range:*** *45-280 cub. ft. of gas per hour.*

**Brass non-blow-off head types:** *deal with 5 to 10 cub. ft. of gas per hour.*

**Stainless steel, "F" type head, burner:** *deals with 8 cub. ft. of gas per hour.*

**Perforated head type burner:** *deals with 10 to 15 cub. ft. of gas per hour.*

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524

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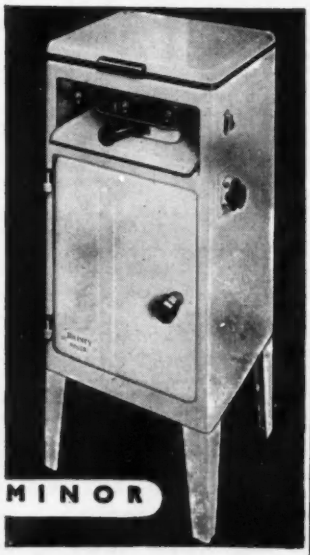
*Approved and adopted by leading gas boards*

The **Dainty** MINOR



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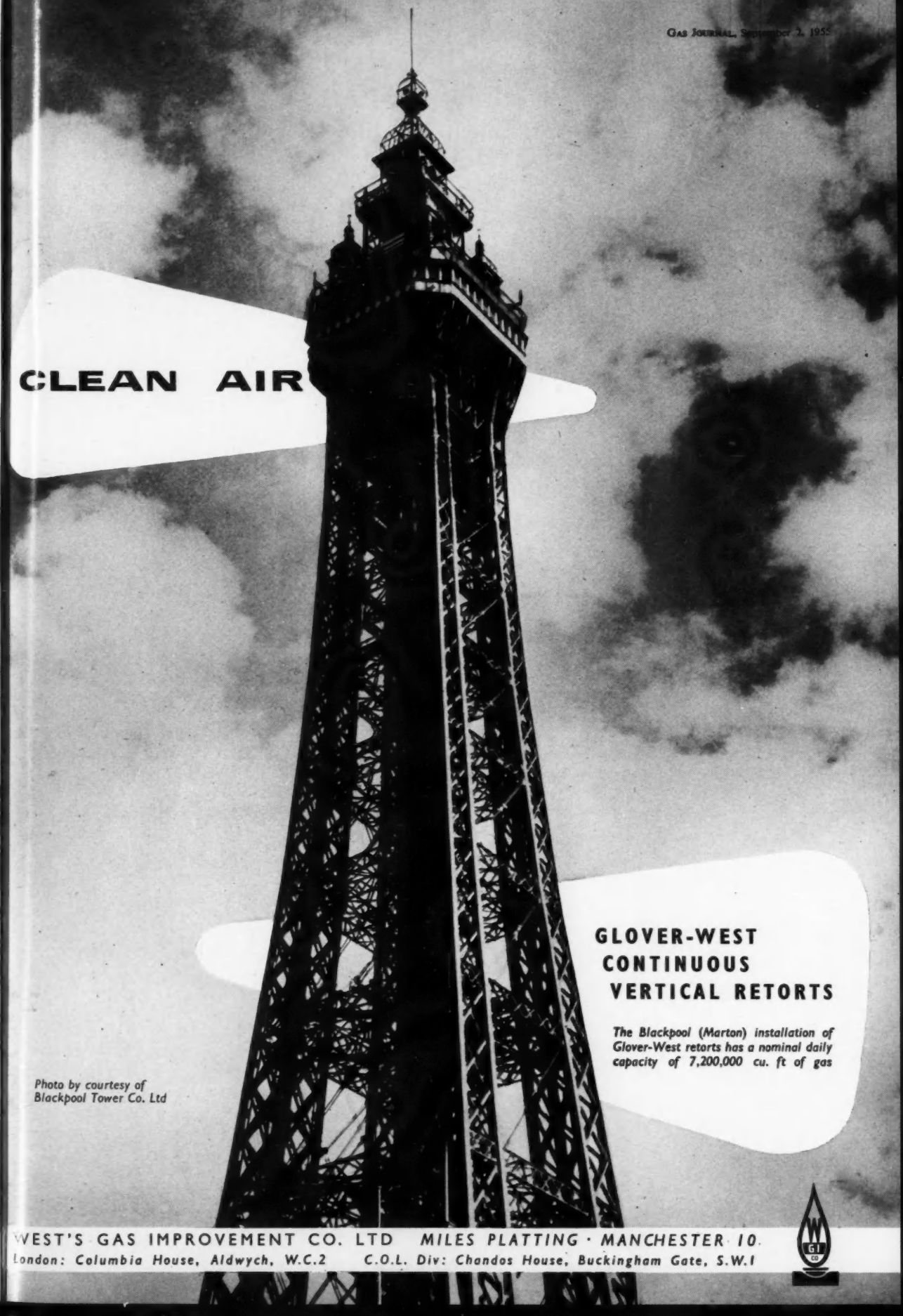

CLEAN AIR

GLOVER-WEST
CONTINUOUS
VERTICAL RETORTS

*The Blackpool (Marton) installation of Glover-West retorts has a nominal daily capacity of 7,200,000 cu. ft of gas*

*Photo by courtesy of Blackpool Tower Co. Ltd*

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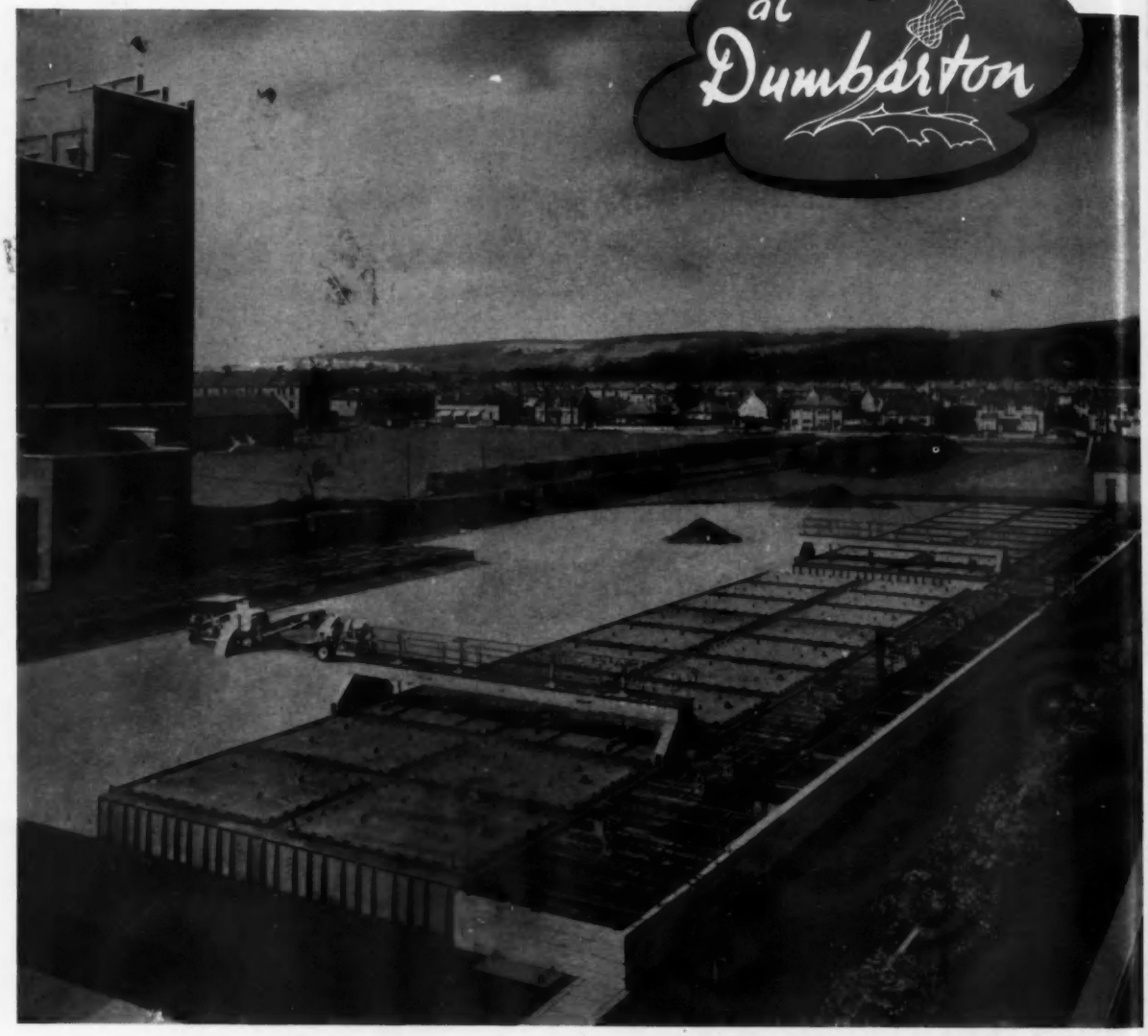
# CAST IRON GROUND LEVEL PURIFIERS

at Dumbarton



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